

NBSIR 78-1341



TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

REPORT NO. 52G



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

Bursting strength	Smoothness
Tearing strength	Surface pick strength
Tensile breaking strength	K & N ink absorption
Elongation to break	pH
Tensile energy absorption	Opacity
Folding endurance	Blue reflectance (brightness)
Stiffness	Specular gloss, 75°
Air resistance	Thickness
Grammage	Concora (flat crush)
	Ring crush

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°
Color and color difference
Retroreflectivity

Rubber (4 times per year)

Tensile strength, ultimate elongation and tensile stress
Hardness
Mooney viscosity
Vulcanization properties

ASTM Textiles (3 times per year)

Flammability (FF3-71 and FF5-74)

ASTM Cement (2 times per year)

Chemical (11 chemical components)
Physical (8 characteristics)

AASHTO Bituminous

Asphalt cement (2 times per year)
Cutbacks (once a year)



Collaborative Reference Programs
B360 Polymer Building
National Bureau of Standards
Washington, D.C. 20234

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 52G

R. G. Powell
TAPPI-NBS Research Associate
Collaborative Testing Services, Inc.

E. B. Randall, Jr., J. Horlick
Laboratory Evaluation Technology Section
Standards Application and Analysis Division
Institute for Applied Technology

U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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INTRODUCTION

Reports 52S and 52G comprise the fourth set of reports for the 77-78 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Please note that some changes have been made in the computer-generated plots. These changes should aid participants in familiarizing themselves with the International System of Units (SI) as it applies to TAPPI test methods. Wherever possible, Grand Means in SI units have been added at the top of the plots, and scales in SI units have been added to the axes allowing the reader to compare means and variability in common units and SI units for the same data. On all plots, sample codes and unit of test have been shifted to new positions.

Notes and comments for individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 4 of this report for an explanation of "Best Values." Please do not confuse these best values with provisional values included with the samples to detect serious discrepancies at the time of test. NBS results, identified as L502 in the optical tests are included in some of the tables.

If there are any questions on the notes, the analyses, or the reports in general, contact Edwin B. Randall, Robert G. Powell, or Jeffrey Horlick on 301/921-2946.



Edwin B. Randall, Jr., Administrator
TAPPI Collaborative Reference Program
Laboratory Evaluation Technology Section

June 19, 1978

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

<u>Physical Quantity</u>	<u>To Convert From</u>	<u>To</u>	<u>Multiply by</u>
Bursting strength	psi	kPa	6.895
	kg/cm ²	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	ft-lb/ft ²	J/m ²	14.59
	in.-lb/in. ²	J/m ²	175.1
	kg-m/m ²	J/m ²	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI) (ISO)	lb	N	4.448
	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

95% ELLIPSE -

Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR -

Average of the R. SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph -

For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45°. The solid sloping line, which may or may not lie close to the 45° line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'O'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

Summary -
(At end of report) In addition to several quantities already defined above, the summary shows the following values for each test method:

REPL CRP - The number of replicate test determinations used in this Collaborative Reference Program.

REPL TAPPI - The number of replicate test determinations in a test result required by the applicable TAPPI Standard or assumed here if there is no TAPPI Standard. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVER SDR. See TAPPI Standard T1206 for definitions and computations.

REPEAT - TAPPI repeatability, a measure of the within-laboratory precision of a test result.

REPROD - TAPPI reproducibility, a measure of the between-laboratory precision of a test result.

Best values - Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+) limits, when these are shown along with the best values.

AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI STANDARD T460 GS-75. AIR RESISTANCE OF PAPER

LAB C&D	SAMPLE H49 MEAN	PRINTING 109 GRAMS PER SQUARE METER					SAMPLE J45 MEAN	PRINTING 86 GRAMS PER SQUARE METER					TEST N. = 10
		DEV	N. DEV	SDR	R. SDR			DEV	N. DEV	SDR	R. SDR		
L100	29.10	-1.84	-1.12	1.85	1.04		12.19	-.03	-.05	1.00	1.19	40D	# L100
L107	32.40	1.46	.89	2.12	1.19		13.30	1.08	1.93	.82	.98	40D	# L107
L121	28.80	-2.14	-1.30	1.87	1.05		12.00	-.22	-.39	.82	.97	40D	# L121
L122	30.71	-.23	-.14	2.45	1.37		12.21	-.01	-.01	.87	1.04	40D	# L122
L123	30.29	-.65	-.39	2.72	1.53		12.52	.30	.54	.86	1.02	40D	# L123
L124G	27.90	-3.04	-1.85	2.51	1.41		11.66	-.56	-1.00	.97	1.16	40D	# L124G
L125	31.29	.35	.22	2.51	1.40		11.89	-.33	-.59	.63	.75	40D	# L125
L127	32.78	1.84	1.12	2.01	1.12		11.80	-.42	-.75	.81	.96	40D	# L127
L128	29.20	-1.74	-1.06	1.03	.58		12.00	-.22	-.39	.67	.79	40D	# L128
L148	28.78	-2.16	-1.31	2.10	1.17		11.42	-.80	-1.43	.64	.76	40D	# L148
L153	29.70	-1.24	-.75	1.16	.65		12.28	.06	.11	.68	.80	40D	# L153
L158	28.80	-2.14	-1.30	1.32	.74		11.50	-.32	-.57	.88	1.04	40D	# L158
L159	33.73	2.79	1.70	1.73	.97		12.54	.32	.58	.89	1.06	40D	# L159
L163	34.10	3.16	1.93	2.04	1.14		13.35	1.13	2.02	1.04	1.24	40D	# L163
L166	33.91	2.97	1.81	1.34	.75		13.09	.87	1.56	.92	1.10	40D	# L166
L174	32.14	1.20	.73	1.60	.90		12.76	.54	.97	1.20	1.42	40D	# L174
L176	38.45	7.51	4.58	2.29	1.28		18.75	6.53	11.67	2.82	3.35	40D	# L176
L182G	31.80	.86	.53	2.04	1.14		12.08	-.14	-.25	.92	1.09	40D	# L182G
L183	33.49	2.46	1.50	1.43	.80		12.85	.63	1.13	1.28	1.52	40D	# L183
L190C	31.20	.26	.16	2.20	1.23		12.59	.37	.66	.53	.63	40D	# L190C
L190R	30.00	-.94	-.57	1.05	.59		12.05	-.17	-.30	.79	.94	40D	# L190R
L223	32.40	1.46	.89	2.07	1.16		12.90	.68	1.22	.80	.95	40D	# L223
L224	29.00	-1.94	-1.18	3.08	1.72		9.56	-2.65	-4.75	.70	.83	40D	X L224
L230G	30.10	-.84	-.51	1.45	.81		12.00	-.22	-.39	.82	.97	40D	# L230G
L232	30.12	-.82	-.50	1.77	.99		12.18	-.04	-.07	.94	1.12	40D	# L232
L238A	34.80	3.86	2.35	1.87	1.05		12.03	-.19	-.34	1.17	1.39	40D	# L238A
L241	28.50	-2.44	-1.48	1.08	.60		11.80	-.42	-.75	.42	.50	40D	# L241
L242	30.60	-.34	-.20	1.90	1.07		12.32	.10	.18	1.04	1.23	40D	# L242
L243G	31.00	.06	.04	.82	.46		12.35	.13	.24	.72	.86	40D	# L243G
L259	30.05	-.89	-.54	1.60	.89		12.24	.02	.04	1.01	1.20	40D	# L259
L261	31.25	.31	.19	2.24	1.25		11.90	-.32	-.57	.51	.61	40D	# L261
L262G	30.06	-.88	-.53	.70	.39		14.28	2.06	3.68	.96	1.14	40D	X L262G
L265	30.56	-.38	-.23	1.73	.97		12.48	.26	.47	.92	1.09	40D	# L265
L278	30.58	-.26	-.16	2.14	1.20		11.86	-.36	-.64	.55	.78	40D	# L278
L301	30.90	-.04	-.02	1.29	.72		11.90	-.32	-.57	.99	1.18	40D	# L301
L308	32.00	1.06	.65	1.25	.70		13.24	1.02	1.83	1.48	1.76	40D	# L308
L312	31.00	.06	.04	1.89	1.05		12.50	.28	.50	1.35	1.61	40D	# L312
L321	32.50	1.66	1.01	1.43	.80		11.20	-1.02	-1.82	.92	1.09	40D	* L321
L324	27.89	-3.05	-1.85	1.75	.98		11.53	-.69	-1.23	.40	.48	40D	# L324
L326	31.80	.86	.53	2.39	1.34		13.28	1.06	1.90	.96	1.14	40D	# L326
L328	29.96	-.98	-.59	1.88	1.05		12.11	-.11	-.19	.68	.80	40D	# L328
L341	30.66	-.28	-.17	.88	.49		12.46	.24	.43	.45	.53	40D	# L341
L344	29.96	-.98	-.59	1.58	.88		11.80	-.42	-.75	.92	1.09	40D	# L344
L376	33.66	2.75	1.68	2.11	1.18		13.05	.83	1.49	.67	.80	40D	# L376
L378	31.44	.50	.31	2.19	1.23		12.96	.74	1.33	1.40	1.66	40D	# L378
L396M	31.50	.56	.34	2.55	1.43		11.40	-.82	-1.46	.70	.83	40D	# L396M
L561	29.40	-1.54	-.93	1.43	.80		11.50	-.72	-1.28	.97	1.15	40D	# L561
L567	30.00	-.94	-.57	2.05	1.15		12.06	-.16	-.28	.66	.78	40D	# L567
L576	29.96	-.98	-.59	1.82	1.02		11.22	-1.00	-1.78	.57	.68	40D	# L576
L599	31.14	.20	.12	1.71	.96		12.11	-.11	-.19	.63	.75	40D	# L599
L604	30.90	-.04	-.02	1.52	.85		11.60	-.62	-1.10	.84	1.00	40D	# L604
GR. MEAN = 30.94 GURLEY UNITS		GRAND MEAN = 12.22 GURLEY UNITS					TEST DETERMINATIONS = 10 48 LABS IN GRAND MEANS						
SD MEANS = 1.64 GURLEY UNITS		SD OF MEANS = .56 GURLEY UNITS					AVERAGE SDR = .84 GURLEY UNITS						
AVERAGE SDR = 1.79 GURLEY UNITS													
L115	28.30	-2.64	-1.60	2.67	1.49		15.00	2.78	4.97	1.25	1.48	40U	# L115
L236	32.25	1.31	.80	1.19	.67		12.77	.55	.99	.65	.77	40E	# L236
L291	31.60	.66	.40	1.65	.92		12.40	.18	.33	.52	.61	40U	# L291
L484	25.22	-5.72	-3.48	1.09	.61		11.16	-1.06	-1.89	.57	.68	40H	# L484
TOTAL NUMBER OF LABORATORIES REPORTING = 55													

Best Values: H49 30.8 + 2.9 Gurley units
J45 12.2 + 0.6 Gurley units

The following laboratories were omitted from the grand means because of extreme test results: 176.

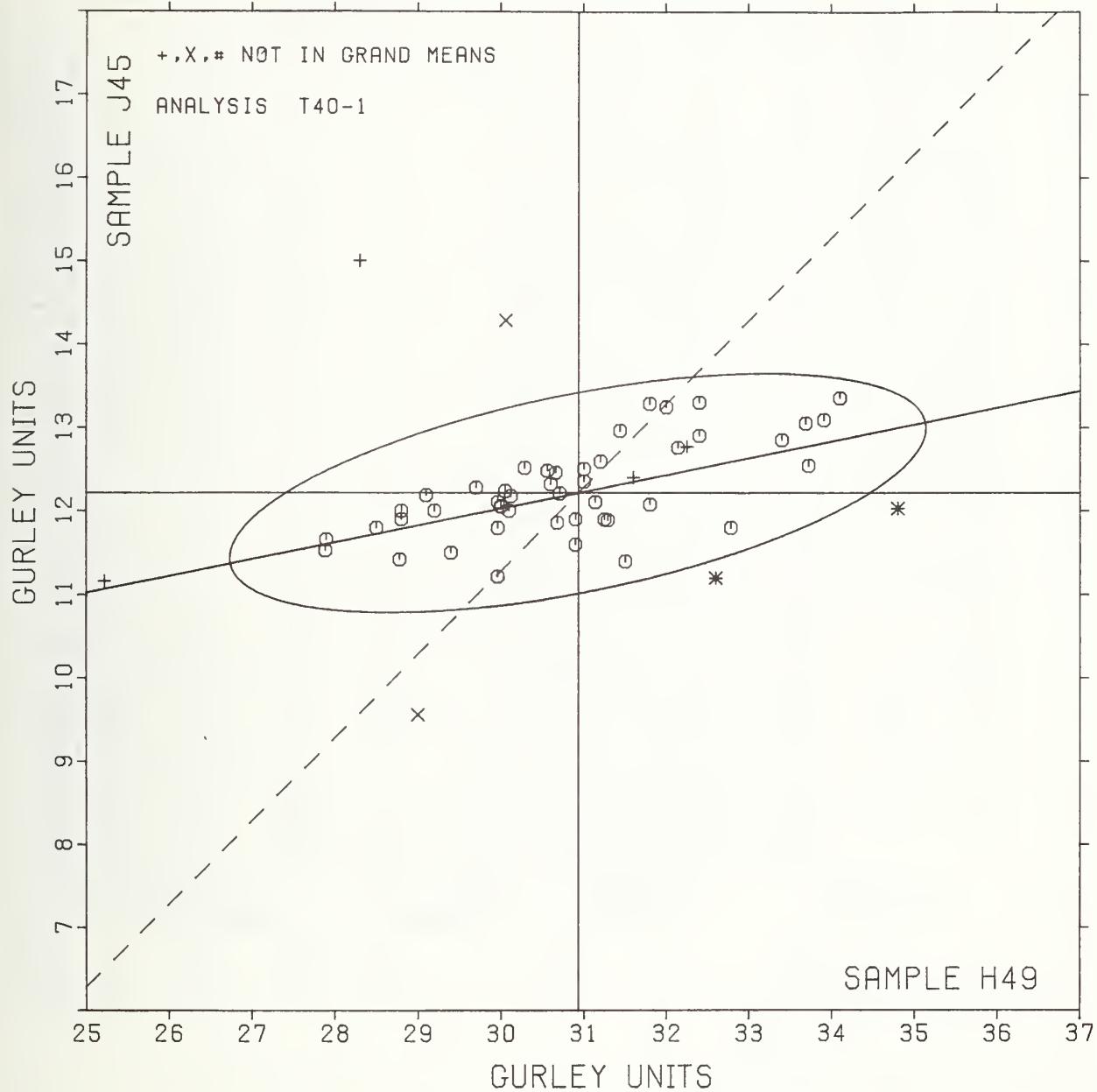
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T40-1 TABLE 2
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI STANDARD T460 GS-75, AIR RESISTANCE OF PAPER

MARCH 1978

LAB CODE	F	MEANS		COORDINATES		R.SDR VAR	PROPERTIES---TEST INSTRUMENT---CONDITIONS
		H49	J45	MAJOR	MINOR		
L484	*	25.22	11.16	-5.81	.09	.65	40H AIR RESISTANCE, REGMED-TYPE GURLEY DENSOMETER - GIL FLOATATION
L324	*	27.89	11.53	-3.12	-.07	.73	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L124G	*	27.90	11.66	-3.09	.05	1.28	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L115	*	28.30	15.00	-2.03	3.25	1.49	40U AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L241	*	28.50	11.80	-2.47	.07	.55	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L148	*	28.78	11.42	-2.27	-.36	.97	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L158	*	28.80	11.90	-2.16	.11	.89	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L121	*	28.80	12.00	-2.14	.21	1.01	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L224	X	29.00	9.56	-2.42	-2.22	1.28	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L100	*	29.10	12.19	-1.80	.33	1.11	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L128	*	29.20	12.00	-1.74	.13	.68	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L561	*	29.40	11.50	-1.65	-.40	.98	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L153	*	29.70	12.28	-1.20	.30	.73	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L576	*	29.96	11.22	-1.15	-.79	.85	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L344	*	29.96	11.80	-1.04	-.22	.99	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L328	*	29.96	12.11	-.98	.09	.93	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L557	*	30.00	12.06	-.95	.03	.97	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L199R	*	30.00	12.05	-.95	.02	.77	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L259	*	30.05	12.24	-.86	.20	1.05	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L262G	X	30.06	14.28	-.45	2.19	.76	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L230G	*	30.10	12.00	-.86	-.05	.89	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L232	*	30.12	12.18	-.81	.12	1.05	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L123	*	30.29	12.52	-.57	.42	1.27	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L265	*	30.56	12.48	-.32	.33	1.03	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L242	*	30.60	12.32	-.31	.17	1.15	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L341	*	30.66	12.46	-.22	.29	.51	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L278	*	30.68	11.86	-.32	-.30	.99	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L122	*	30.71	12.21	-.22	.04	1.20	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L604	*	30.90	11.60	-.16	.60	.93	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L301	*	30.90	11.90	-.10	-.30	.95	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L243G	*	31.00	12.35	.09	.12	.66	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L312	*	31.00	12.50	.12	.26	1.33	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L599	*	31.14	12.11	.18	-.15	.85	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L190C	*	31.20	12.59	.33	.31	.93	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L261	*	31.25	11.90	.25	-.37	.93	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L125	*	31.29	11.89	.28	-.39	1.08	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L378	*	31.44	12.96	.64	.63	1.44	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L396M	*	31.50	11.40	.39	-.91	1.13	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L291	*	31.60	12.40	.69	.05	.77	40U AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L182G	*	31.80	12.08	.62	-.31	1.12	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L326	*	31.80	13.28	1.06	.87	1.24	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L308	*	32.00	13.24	1.25	.79	1.23	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L174	*	32.14	12.76	1.29	.29	1.16	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L236	*	32.25	12.77	1.40	.28	.72	40E AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION, 20C, 65%RH
L107	*	32.40	13.30	1.65	.77	1.08	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L223	*	32.40	12.90	1.57	.38	1.05	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L321	*	32.60	11.20	1.43	-1.33	.95	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L127	*	32.78	11.80	1.73	-.77	1.04	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L183	*	33.40	12.85	2.54	.13	1.16	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L376	*	33.69	13.05	2.86	.27	.99	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L159	*	33.73	12.54	2.80	-.24	1.01	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L166	*	33.91	13.09	3.09	.27	.92	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L163	*	34.10	13.35	3.33	.49	1.19	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L238A	*	34.80	12.03	3.75	-.95	1.22	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
L176	*	38.45	18.75	8.66	4.92	2.31	40D AIR RESISTANCE, GURLEY DENSOMETER - GIL FLOATATION
GMEANS:		30.94	12.22		1.00		
		95% ELLIPSE:	4.28	1.18	WITH GAMMA = 11 DEGREES		

AIR RESISTANCE, GURLEY

SAMPLE H49 = 30.9 GURLEY UNITS SAMPLE J45 = 12.2 GURLEY UNITS



AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) GRIFFICE
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE	PRINTING					SAMPLE	PRINTING					TEST D.* 10	
		H49	109 GRAMS PER SQUARE METER	MEAN	DEV	N.DEV	SDR	R.SDR	J45	86 GRAMS PER SQUARE METER	MEAN	DEV	N.DEV	SDR
L114	110.9	6.4	1.28	5.1	1.13	234.4	12.3	1.18	12.3	1.03	40S	0	L114	
L121	104.2	-.3	-.06	3.4	.76	222.5	.4	.04	18.6	1.55	40S	0	L121	
L122S	97.1	-.74	-1.48	2.8	.63	220.3	-.18	-.17	13.0	1.09	40S	0	L122S	
L124S	99.6	-.49	-.98	4.5	.99	209.4	-.12.7	-.12.2	7.7	.65	40S	0	L124S	
L127	276.5	172.0	34.40	11.3	2.52	165.1	-.57.0	-.54.9	9.1	.76	40S	#	L127	
L132	101.0	-.3.5	-.70	3.8	.85	217.2	-.4.9	-.4.7	12.3	1.03	40S	0	L132	
L148	104.3	-.2	-.04	4.2	.93	216.4	-.5.7	-.5.5	11.5	.96	40S	0	L148	
L150	104.5	-.0	-.00	2.8	.63	239.5	17.4	1.68	10.1	.85	40S	0	L150	
L157	103.1	-.1.4	-.28	4.7	1.05	217.9	-.4.2	-.4.1	12.4	1.04	40S	0	L157	
L158	119.5	15.0	3.00	5.5	1.23	231.0	8.9	.86	15.2	1.27	40S	#	L158	
L173B	103.0	-.1.5	-.30	4.2	.94	219.5	-.2.6	-.2.5	13.8	1.16	40S	0	L173B	
L190C	107.1	2.6	.52	5.3	1.18	226.2	4.1	.39	16.9	1.42	40S	0	L190C	
L213	107.5	3.0	.60	4.9	1.10	223.0	.9	.09	15.4	1.29	40S	0	L213	
L223	99.8	-.4.7	-.94	4.0	.89	213.6	-.8.5	-.8.2	15.2	1.27	40S	0	L223	
L228	112.9	8.4	1.68	3.9	.86	239.4	17.3	1.57	8.3	.69	40S	0	L228	
L230S	100.3	-.4.2	-.84	3.5	.77	200.3	-.21.8	-.21.0	9.1	.76	40S	0	L230S	
L233	104.2	-.3	-.06	4.6	1.03	235.9	13.8	1.33	9.1	.76	40S	0	L233	
L241	109.5	5.0	1.00	5.0	1.11	241.0	18.9	1.82	9.7	.81	40S	0	L241	
L249	100.5	-.4.0	-.80	3.7	.84	217.5	-.4.6	-.4.4	14.2	1.19	40S	0	L249	
L255	113.0	8.5	1.70	5.0	1.12	233.5	11.4	1.10	7.1	.59	40S	0	L255	
L257A	103.4	-.1.1	-.22	3.9	.88	219.4	-.2.7	-.2.6	15.3	1.28	40S	0	L257A	
L257B	104.4	-.1	-.02	10.4	2.31	212.5	-.9.6	-.9.3	9.4	.78	40S	0	L257B	
L257C	108.9	4.4	.88	3.0	.68	217.9	-.4.2	-.4.1	16.7	1.40	40S	0	L257C	
L260	106.3	1.8	.36	3.3	.74	231.7	9.5	.92	19.3	1.61	40S	0	L260	
L262S	107.2	2.7	.54	4.9	1.09	228.1	6.0	.58	9.5	.80	40S	0	L262S	
L288	110.2	5.7	1.14	6.1	1.37	221.5	-.6	-.06	11.3	.95	40S	0	L288	
L301	108.3	3.8	.76	2.7	.60	NO DATA	REPORTEED FOR SAMPLE J45				40S	M	L301	
L312	103.1	-.1.4	-.28	3.2	.72	171.2	-.50.9	-.4.91	3.2	.26	40S	#	L312	
L318	97.2	-.7.3	-.1.46	4.3	.95	234.4	12.3	1.18	21.8	1.82	40S	#	L318	
L349	103.7	-.8	-.16	3.9	.87	202.8	-.19.3	-.1.86	10.1	.84	40S	0	L349	
L352	104.5	-.0	-.00	5.0	1.11	226.5	4.4	.42	13.1	1.10	40S	0	L352	
L354	103.9	-.6	-.12	5.2	1.15	215.4	-.6.7	-.6.5	9.2	.77	40S	0	L354	
L360	100.3	-.4.2	-.84	4.1	.92	215.1	-.7.0	-.6.8	8.8	.74	40S	0	L360	
L370	101.8	-.2.7	-.54	2.3	.50	204.9	-.17.2	-.1.66	9.1	.76	40S	0	L370	
L390	109.3	4.8	.96	5.4	1.20	225.7	3.6	.35	7.3	.61	40S	0	L390	
L562	279.5	175.0	35.01	11.7	2.60	527.0	304.9	29.38	42.9	3.58	40S	#	L562	
L575	103.2	-.1.3	-.26	6.3	1.40	230.1	8.0	.77	15.0	1.25	40S	0	L575	
LS87	99.5	-.5.0	-1.00	3.7	.82	225.0	2.9	.28	10.8	.90	40S	0	L587	
L597	99.8	-.4.7	-.54	6.0	1.34	215.0	-.7.1	-.6.9	9.4	.79	40S	0	L597	
L600	96.8	-.7.7	-1.54	3.6	.79	211.5	-.10.6	-.1.02	15.7	1.31	40S	0	L600	

GR. MEAN = 104.5 SHEFF. UNITS

SD MEANS = 5.0 SHEFF. UNITS

AVERAGE SDR = 4.5 SHEFF. UNITS

GRAND MEAN = 222.1 SHEFF. UNITS

SD OF MEANS = 10.4 SHEFF. UNITS

AVERAGE SDR = 12.0 SHEFF. UNITS

TEST DETERMINATIONS = 10

36 LABS IN GRAND MEANS

TOTAL NUMBER OF LABORATORIES REPORTING = 43

Best Values: H49 104 + 7 Sheffield units
J45 221 + 17 Sheffield units

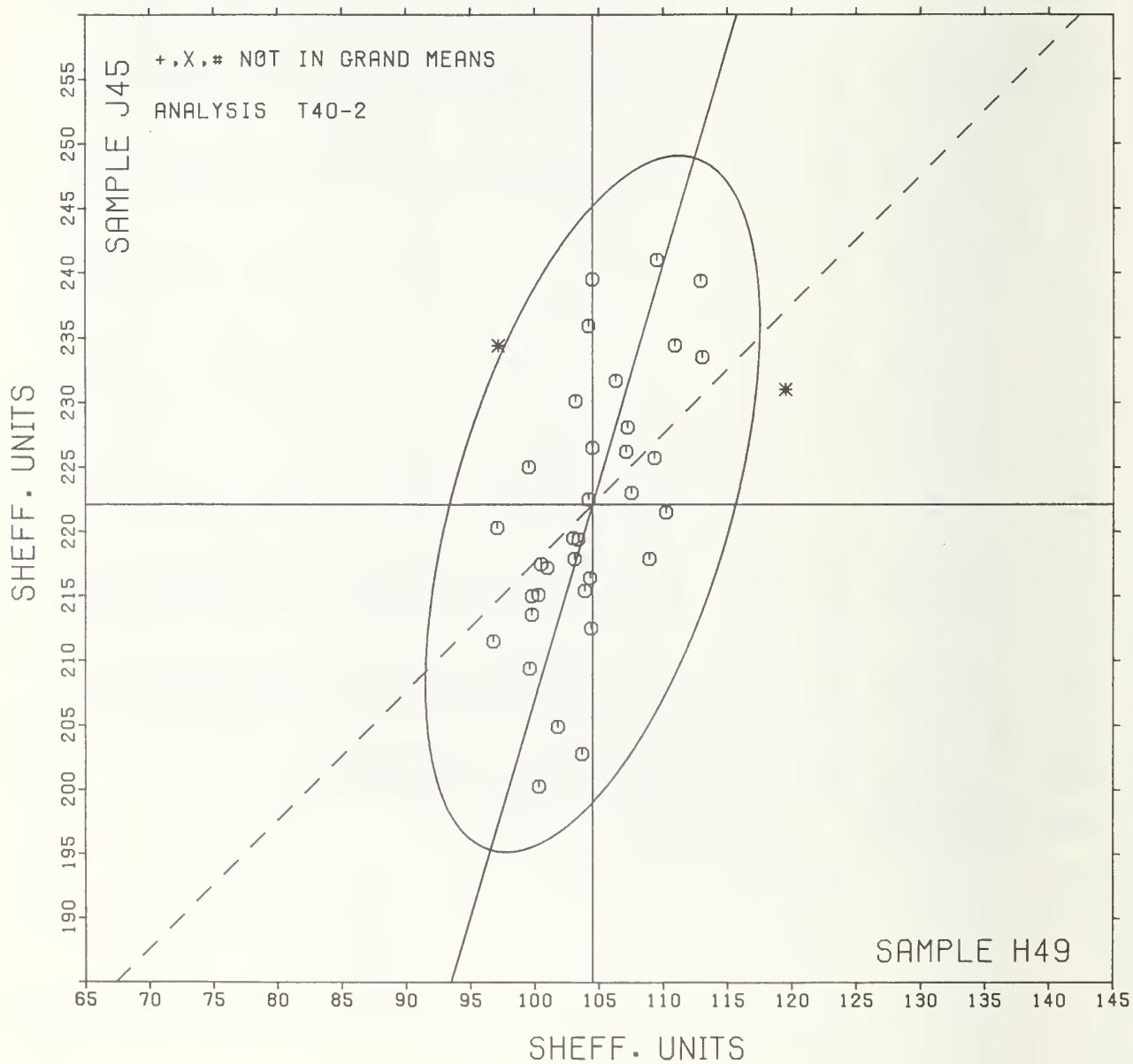
The following laboratories were omitted from the grand means because of extreme test results: 127, 312, 562.

ANALYSIS T40-2 TABLE 2
AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

LAB CODE	P	MEANS		COORDINATES		R.S.D.R VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		H49	J45	MAJOR	MINOR		
L600	G	96.8	211.5	-12.4	4.4	1.05	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L122S	G	97.1	220.3	-3.8	6.6	.86	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L318 *	G	97.2	234.4	9.7	10.5	1.39	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L587	G	99.5	225.0	1.3	5.6	.86	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L124S	G	99.6	209.4	-13.6	1.1	.82	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L597	G	99.8	215.0	-8.2	2.5	1.06	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L223	G	99.8	213.6	-9.5	2.1	1.08	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L350	G	100.3	215.1	-7.9	2.0	.83	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L230S	G	100.3	200.3	-22.1	-2.2	.77	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L249	G	100.5	217.5	-5.6	2.5	1.01	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L132	G	101.0	217.2	-5.7	2.0	.94	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L370	G	101.8	204.9	-17.3	-2.3	.63	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L173B	G	103.0	219.5	-2.9	.7	1.05	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L312	#	103.1	171.2	-49.2	-13.1	.49	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L157	G	103.1	217.9	-4.4	.2	1.05	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L575	G	103.2	230.1	7.3	3.5	1.33	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257A	G	103.4	219.4	-2.9	.3	1.08	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L349	G	103.7	202.8	-18.7	-4.7	.86	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L354	G	103.9	215.4	-6.6	-1.3	.96	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L121	G	104.2	222.5	.3	.4	1.16	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L233	G	104.2	235.9	13.1	4.2	.90	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L148	G	104.3	216.4	-5.5	-1.4	.95	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257B	G	104.4	212.5	-9.2	-2.6	1.55	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L150	G	104.5	239.5	16.7	5.0	.74	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L352	G	104.5	226.5	4.2	1.3	1.10	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L260	G	106.3	231.7	9.7	1.0	1.17	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L190C	G	107.1	226.2	4.7	-1.3	1.30	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L262S	G	107.2	228.1	6.5	-9	.94	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L213	G	107.5	223.0	1.7	-2.6	1.20	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L301	M	108.3				.60	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L257C	G	108.9	217.9	-2.8	-5.4	1.04	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L390	G	109.3	225.7	4.8	-3.6	.90	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L241	G	109.5	241.0	19.5	.6	.96	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L288	G	110.2	221.5	1.0	-5.6	1.16	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L114	G	110.9	234.4	13.6	-2.6	1.08	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L228	G	112.9	239.4	19.0	-3.1	.78	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L255	G	113.0	233.5	13.3	-4.9	.86	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L158 *	G	119.5	231.0	12.8	-11.8	1.25	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L127	#	276.5	165.1	-5.8	-181.1	1.64	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L562	#	279.5	527.0	342.0	-81.2	3.09	40S AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L182B	*	371.0	971.5	794.2	-42.6	5.49	40B AIR RESISTANCE, BENDTSEN, WG 150
L484	*	388.0	930.0	759.3	-70.7	3.49	40B AIR RESISTANCE, BENDTSEN, WG 150
L243B	*	404.1	1017.0	847.2	-61.4	2.98	40B AIR RESISTANCE, BENDTSEN, WG 150
GMANS:		104.5	222.1		1.00		
95% ELLIPSE:		27.9	10.7		WITH GAMMA = 73 DEGREES		

AIR RESISTANCE, SHEFFIELD

SAMPLE H49 = 105. SHEFF. UNITS SAMPLE J45 = 222. SHEFF. UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T41-1 TABLE 1
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

MARCH 1978

LAB CODE	SAMPLE		BACKING				SAMPLE				RELEASE				TEST D. = 10		
	E64 MEAN	98 GRAMS DEV	PER SQUARE METER	N. DEV	SDR	R.SDR	E68 MEAN	95 GRAMS DEV	PER SQUARE METER	N. DEV	SDR	R.SDR	VAR	F	LAB		
L122	529.	.19.	.54	.92.	.94	.947.	142.	1.66	105.	1.05	.41G	.8	L122				
L128	531.	.21.	.60	81.	.83	809.	.4.	.05	62.	.62	.41G	.8	L128				
L134	513.	.3.	.09	35.	.35	884.	.79.	.93	51.	.51	.41G	.8	L134				
L166M	587.	.77.	2.20	134.	1.36	766.	-.39.	-.45	100.	1.00	.41G	.8	L166M				
L195	486.	-.24.	-.69	102.	1.04	805.	-.0.	-.00	76.	.76	.41G	.8	L195				
L202	493.	-.17.	-.49	73.	.74	886.	.81.	.95	82.	.82	.41G	.8	L202				
L224	487.	-.23.	-.65	74.	.76	915.	110.	1.28	81.	.81	.41G	.8	L224				
L230	535.	.25.	.72	58.	.59	835.	.30.	.35	119.	1.19	.41G	.8	L230				
L259	547.	.37.	1.05	142.	1.44	798.	-.7.	-.08	112.	1.12	.41G	.8	L259				
L358	490.	-.20.	-.58	193.	1.96	603.	-.202.	-.236	74.	.74	.41G	.8	L358				
L557	454.	-.55.	-.1.59	174.	1.77	782.	-.23.	-.27	132.	1.32	.41G	.8	L557				
L559	455.	-.44.	-.1.27	119.	1.21	708.	-.97.	-.1.14	133.	1.33	.41G	.8	L559				
L560	499.	-.11.	-.31	70.	.71	769.	-.36.	-.42	135.	1.35	.41G	.8	L560				
L561	542.	.32.	.93	63.	.64	754.	-.51.	-.60	117.	1.17	.41G	.8	L551				
L576	490.	-.19.	-.55	65.	.66	815.	.10.	.12	119.	1.19	.41G	.8	L576				

GR. MEAN = 510. SEC/10 CC
SD MEANS = 35. SEC/10 CC

GRAND MEAN = 805. SEC/10 CC
SD OF MEANS = 86. SEC/10 CC

TEST DETERMINATIONS = 10
15 LABS IN GRAND MEANS

AVERAGE SDR = 98. SEC/10 CC

AVERAGE SDR = 100. SEC/10 CC

TOTAL NUMBER OF LABORATORIES REPORTING = 15

Best Values: E64 500 \pm 50 second per 10 cc,
E68 850 \pm 130 mercury density
(direct reading)

The values reported here are the time in seconds required for the displacement of 10 ml of air through an area of 1.0 in² of the specimen. The values are not converted to 100 ml of air nor to oil density.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T41-1 TABLE 2
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

MARCH 1978

LAB CODE	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS	
	F	E64	E68	MAJOR	MINOR			
L557	0	454.	782.	-.26.	.54.	1.55	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L559	0	465.	708.	-.100.	.39.	1.27	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L195	0	486.	805.	-.2.	.24.	.90	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L224	0	467.	915.	108.	.29.	.78	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L358	0	490.	603.	-.203.	.9.	1.35	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L576	0	490.	815.	.9.	.20.	.93	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L202	0	493.	886.	.80.	.22.	.78	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L560	0	499.	769.	-.37.	.9.	1.03	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L134	0	513.	884.	.79.	.1.	.43	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L122	0	529.	947.	143.	-.11.	.99	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L128	0	531.	809.	.5.	-.21.	.72	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L230	0	535.	835.	.31.	-.24.	.89	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L561	0	542.	754.	-.49.	-.35.	.91	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L259	0	547.	798.	-.5.	-.37.	1.28	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L166M	0	587.	766.	-.35.	-.79.	1.18	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION

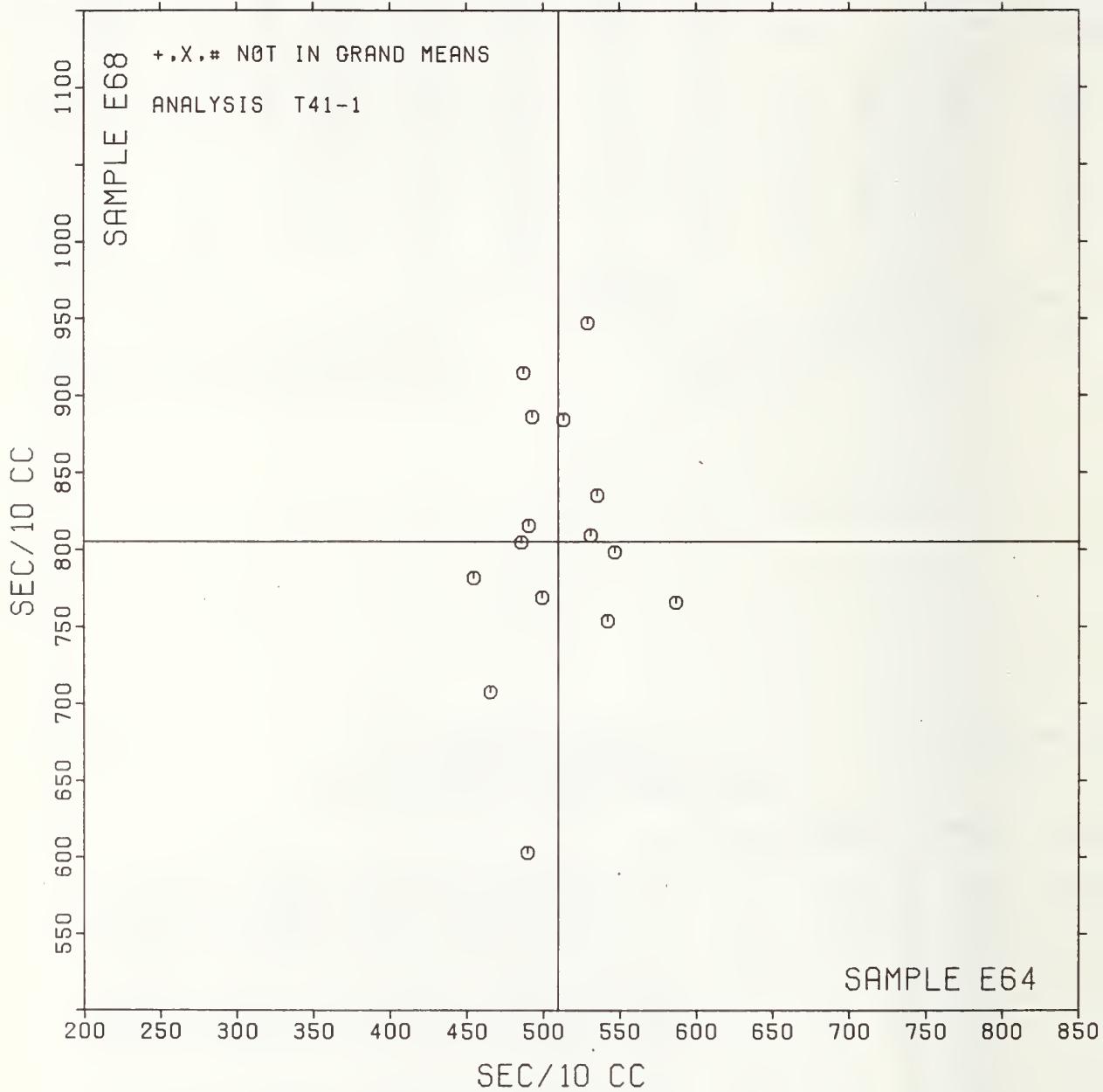
GMEANS: 510. 805.

95% ELLIPSE: 245. 99. WITH GAMMA = 86 DEGREES

AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE E64 = 510. SEC/10 CC

SAMPLE E68 = 805. SEC/10 CC



TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T44-1 TABLE 1
 SMOOTHNESS, PARKER PRINTSURF

MARCH 1978

LAB CODE	SAMPLE E36 WRITING 72 GRAMS PER SQUARE METER					SAMPLE B91 HEAT SET OPPSET BOOK 76 GRAMS PER SQUARE METER					TEST D. = 10		
	MEAN	DEV	N. DEV	SDR	R.SDR	MEAN	DEV	N. DEV	SDR	R.SDR	VAR	P	LAB
L122	4.74	.72	5.18	.11	.77	5.34	1.07	3.50	.19	1.00	44P	#	L122
L136	4.07	.05	.33	.15	1.03	4.39	.12	.41	.14	.77	44P	S	L136
L182	3.88	-.14	-1.03	.13	.93	3.93	-.33	-1.08	.25	1.35	44P	G	L182
L183	3.84	-.18	-1.32	.08	.58	3.80	-.47	-1.52	.14	.75	44P	G	L183
L223	4.11	.09	.63	.15	1.05	4.27	.00	.01	.26	1.36	44P	G	L223
L288	4.20	.18	1.29	.10	.73	4.70	.44	1.43	.14	.73	44P	G	L288
L317	4.13	.11	.76	.18	1.22	4.43	.16	.54	.25	1.33	44P	G	L317
L588	3.93	-.09	-.67	.21	1.46	4.33	.06	.21	.13	.71	44P	G	L588
GR. MEAN = 4.02 MICRONS						GRAND MEAN = 4.27 MICRONS					TEST DETERMINATIONS = 10		
SD MEANS = .14 MICRONS						SD OF MEANS = .31 MICRONS					7 LABS IN GRAND MEANS		
AVERAGE SDR = .14 MICRONS						AVERAGE SDR = .19 MICRONS							
TOTAL NUMBER OF LABORATORIES REPORTING = 8													

Best Values: E36 4.0 microns
 B91 4.3 microns

The following laboratories were omitted from the grand means because of extreme test results: L22.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T44-1 TABLE 2
 SMOOTHNESS, PARKER PRINTSURF

MARCH 1978

LAB CODE	P	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		E36	B91	MAJOR	MINOR					
L183	G	3.84	3.80	-.50	-.01	.67	44P	SMOOTHNESS, PARKER PRINTSURF		
L182	G	3.88	3.93	-.36	.00	1.14	44P	SMOOTHNESS, PARKER PRINTSURF		
L588	G	3.93	4.33	.02	.11	1.09	44P	SMOOTHNESS, PARKER PRINTSURF		
L136	G	4.07	4.39	.13	.01	.90	44P	SMOOTHNESS, PARKER PRINTSURF		
L223	G	4.11	4.27	.04	-.08	1.20	44P	SMOOTHNESS, PARKER PRINTSURF		
L317	G	4.13	4.43	.19	-.03	1.27	44P	SMOOTHNESS, PARKER PRINTSURF		
L288	G	4.20	4.70	.47	.00	.73	44P	SMOOTHNESS, PARKER PRINTSURF		
L122	#	4.74	5.34	1.27	-.25	.89	44P	SMOOTHNESS, PARKER PRINTSURF		
GMEANS:		4.02	4.27			1.00				
95% ELLIPSE:			1.24		.22			WITH GAMMA = 67 DEGREES		

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

MARCH 1978

SAMPLE LA8 CGDE	E36 MEAN	WRITING				SAMPLE B91 MEAN	HEAT SET OFFSET BOOK				TEST D. = 15		
		72 GRAMS PER SQUARE METER	DEV	N.DEV	SDR		76 GRAMS PER SQUARE METER	DEV	N.DEV	SDR	R.SDR	VAR	F
L100	105.0	.1	.01	5.9	1.01	127.7	-.3	-.05	7.9	.81	45S	Ø	L100
L107	118.7	13.7	2.70	7.1	1.21	142.0	14.0	2.22	12.4	1.27	45S	*	L107
L108	105.5	.6	.12	3.9	.66	125.9	-2.1	-.33	9.5	.98	45S	Ø	L108
L114	107.7	2.7	.54	3.8	.65	130.1	2.2	.34	12.2	1.25	45S	Ø	L114
L115	102.3	-2.6	-.51	6.5	1.11	131.0	3.0	.48	8.7	.90	45S	Ø	L115
L121	106.5	1.5	.30	5.8	.99	124.9	-3.0	-.48	13.1	1.35	45S	Ø	L121
L122	107.2	2.3	.44	9.2	1.56	129.3	1.4	.22	8.6	.88	45S	Ø	L122
L123	99.8	-5.1	-1.01	4.3	.73	126.9	-1.1	-.17	8.7	.90	45S	Ø	L123
L124	102.6	-2.3	-.46	6.8	1.15	121.9	-6.0	-.96	8.0	.83	45S	Ø	L124
L125	101.3	-3.6	-.71	8.5	1.46	121.0	-7.0	-1.10	9.5	.98	45S	Ø	L125
L126	99.5	-5.4	-1.06	5.6	.96	125.7	-2.3	-.36	10.6	1.09	45S	Ø	L126
L128	108.8	3.9	.76	5.9	1.00	126.7	-1.3	-.21	8.4	.86	45S	Ø	L128
L132	99.5	-5.5	-1.08	6.2	1.06	131.7	3.7	.59	11.9	1.23	45S	Ø	L132
L134	103.3	-1.6	-.32	5.4	.93	128.5	.5	.08	6.0	.62	45S	Ø	L134
L139S	108.9	4.0	.78	4.9	.83	129.7	1.7	.27	8.8	.91	45S	Ø	L139S
L148	111.0	6.1	1.19	6.0	1.02	130.9	3.0	.47	10.9	1.12	45S	Ø	L148
L150	100.0	-4.9	-.97	8.9	1.51	121.0	-7.0	-1.10	11.7	1.20	45S	Ø	L150
L152	106.5	1.5	.30	3.1	.53	135.2	7.2	1.14	7.5	.78	45S	Ø	L152
L153	118.9	13.9	2.74	7.0	1.19	141.7	13.7	2.17	12.2	1.26	45S	*	L153
L157	107.3	2.3	.46	5.3	.90	135.6	7.6	1.21	8.9	.92	45S	Ø	L157
L158	116.0	11.1	2.17	8.1	1.38	137.0	9.0	1.43	11.9	1.23	45S	Ø	L158
L159	102.1	-2.9	-.57	6.8	1.15	130.1	2.1	.33	11.2	1.16	45S	Ø	L159
L162	107.7	2.7	.54	4.6	.79	133.3	5.4	.85	7.9	.82	45S	Ø	L162
L166	97.5	-7.4	-1.46	7.2	1.24	119.3	-8.6	-1.37	10.8	1.11	45S	Ø	L166
L167	104.3	-.6	-.12	3.2	.55	127.0	-1.0	-.15	5.9	.61	45S	Ø	L167
L1738	107.0	2.1	.40	5.6	.96	122.3	-5.6	-.89	8.2	.85	45S	Ø	L1738
L176S	103.8	-1.1	-.22	7.5	1.27	130.3	2.4	.37	7.3	.75	45S	Ø	L176S
L183S	104.7	-.2	-.04	2.7	.45	127.7	-.2	-.04	13.3	1.37	45S	Ø	L183S
L190C	103.3	-1.6	-.32	8.8	1.50	129.2	1.2	.19	12.6	1.30	45S	Ø	L190C
L190R	108.8	3.9	.76	9.0	1.54	129.9	1.9	.30	9.7	1.00	45S	Ø	L190R
L195	100.2	-4.7	-.93	6.8	1.16	121.5	-6.4	-1.02	9.5	.98	45S	Ø	L195
L203	108.1	3.1	.61	7.7	1.31	131.3	3.4	.53	13.8	1.42	45S	Ø	L203
L211	97.7	-7.3	-1.43	6.3	1.07	120.9	-7.1	-1.12	12.6	1.29	45S	Ø	L211
L213	99.3	-5.6	-1.10	5.8	.99	126.9	-1.1	-.17	9.5	.98	45S	Ø	L213
L221	93.0	-11.9	-2.35	6.5	1.11	122.4	-5.6	-.88	10.5	1.08	45S	*	L221
L223	€3.9	-11.1	-2.18	7.7	1.32	118.9	-9.1	-1.44	8.1	.83	45S	Ø	L223
L224	114.5	9.6	1.89	2.9	.49	132.1	4.2	.66	9.9	1.02	45S	Ø	L224
L226B	97.4	-7.5	-1.48	5.2	.90	117.1	-10.8	-1.72	8.7	.89	45S	Ø	L226B
L228	107.8	2.9	.56	8.2	1.39	125.4	-2.6	-.41	10.7	1.10	45S	Ø	L228
L230S	103.9	-1.1	-.21	4.6	.79	129.0	1.0	.16	12.7	1.30	45S	Ø	L230S
L231	110.4	5.5	1.07	8.5	1.46	140.3	12.3	1.95	9.7	1.00	45S	Ø	L231
L232S	106.0	1.1	.21	5.1	.87	131.7	3.7	.59	11.9	1.23	45S	Ø	L232S
L233	100.2	-4.7	-.93	5.3	.90	137.7	9.7	1.54	11.4	1.17	45S	*	L233
L241	109.3	4.4	.86	5.6	.96	128.0	.0	.00	5.3	.54	45S	Ø	L241
L249	101.3	-3.7	-.72	3.8	.65	125.8	-2.2	-.34	14.1	1.45	45S	Ø	L249
L254	106.5	1.6	.31	6.3	1.07	133.9	6.0	.94	12.2	1.26	45S	Ø	L254
L255	104.7	-.3	-.05	2.7	.46	111.4	-16.6	-2.62	4.5	.47	45S	X	L255
L257A	100.3	-4.7	-.92	7.0	1.20	121.4	-6.5	-1.04	8.4	.87	45S	Ø	L257A
L257B	109.6	4.7	.92	8.5	1.44	128.9	.9	.14	10.8	1.12	45S	Ø	L257B
L257C	112.9	7.9	1.56	5.1	.87	130.3	2.3	.36	13.5	1.39	45S	Ø	L257C
L259	113.8	8.9	1.74	6.7	1.14	137.3	9.4	1.48	9.9	1.02	45S	Ø	L259
L260	106.7	1.7	.34	3.6	.62	130.3	2.4	.37	5.3	.54	45S	Ø	L260
L261	99.7	-5.2	-1.02	5.4	.92	124.9	-3.0	-.48	9.5	.98	45S	Ø	L261
L262	109.4	4.5	.88	4.6	.78	143.5	15.5	2.45	6.7	.69	45S	*	L262
L275	103.7	-1.3	-.25	9.5	1.63	131.3	3.4	.53	9.7	1.00	45S	Ø	L275
L277	115.1	10.1	1.99	4.9	.83	141.5	13.6	2.15	10.7	1.10	45S	Ø	L277
L278	102.7	-2.2	-.43	7.6	1.29	130.8	2.8	.45	12.8	1.31	45S	Ø	L278
L281	103.3	-1.6	-.32	4.9	.83	125.7	-2.2	-.35	10.8	1.11	45S	Ø	L281
L288	99.5	-5.5	-1.08	6.9	1.18	127.2	-.8	-.12	8.7	.89	45S	Ø	L288
L290	95.1	-9.9	-1.94	6.9	1.17	114.0	-14.0	-2.21	7.6	.79	45S	Ø	L290
L291S	105.7	.7	.14	4.3	.73	130.6	2.6	.42	8.7	.90	45S	Ø	L291S
L297	105.7	.7	.14	6.2	1.06	130.7	2.7	.43	10.2	1.05	45S	Ø	L297
L301	106.7	1.7	.34	3.0	.51	125.4	-2.6	-.41	7.4	.76	45S	Ø	L301
L308	106.9	2.0	.39	5.8	.99	133.3	5.3	.84	7.4	.76	45S	Ø	L308
L312	106.7	1.8	.35	5.2	.89	120.5	-7.5	-1.19	7.0	.72	45S	Ø	L312

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS TA5-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

MARCH 1978

LA8 C6D3	SAMPLE E36 MEAN	WRITING				SAMPLE B91 MEAN	HEAT SET OFFSET BOOK				TEST D. = 15		
		72 GRAMS PER SQUARE METER	DEV	N.DEV	SDR		76 GRAMS PER SQUARE METER	DEV	N.DEV	SDR	R.SDR	VAR	F
L317	100.7	-4.2	.83	6.2	1.06	124.1	-3.8	.61	11.7	1.20	45S	G	L317
L318	100.5	-4.5	.88	5.5	.94	123.1	-4.8	.77	9.9	1.02	45S	G	L318
L321	97.7	-7.3	-1.43	5.6	.96	112.0	-16.0	-2.53	7.7	.80	45S	*	L321
L323	109.3	4.4	.86	5.3	.90	133.3	5.4	.85	14.2	1.46	45S	G	L323
L326	105.5	.6	.12	6.3	1.08	124.0	-4.0	-.63	6.6	.68	45S	G	L326
L328	106.6	1.7	.33	4.2	.72	128.5	.6	.09	7.9	.82	45S	G	L328
L341	104.8	-.1	-.03	4.1	.71	122.1	-5.8	-.92	9.1	.93	45S	G	L341
L342	109.5	4.5	.89	3.8	.65	134.9	7.0	1.10	9.6	.99	45S	G	L342
L349	99.4	-5.5	-1.09	6.6	1.12	120.3	-7.6	-1.21	8.7	.90	45S	G	L349
L352	108.8	3.9	.76	6.8	1.17	127.1	-.8	-.13	10.6	1.09	45S	G	L352
L360	102.0	-2.9	-.58	4.8	.81	121.5	-6.5	-1.03	8.4	.87	45S	G	L360
L366	106.2	1.3	.25	2.9	.50	126.4	-1.6	-.25	12.2	1.26	45S	G	L366
L370	101.0	-3.9	-.78	4.3	.73	120.7	-7.2	-1.15	5.3	.54	45S	G	L370
L372	107.4	2.5	.48	7.9	1.35	127.5	-.5	-.08	11.6	1.20	45S	G	L372
L376	110.4	5.5	1.07	4.4	.75	131.1	3.1	.49	10.3	1.06	45S	G	L376
L378	103.1	-1.9	-.37	4.1	.70	127.4	-.6	-.09	15.0	1.55	45S	G	L378
L382	103.6	-1.3	-.26	6.7	1.14	119.2	-8.8	-1.39	10.5	1.08	45S	G	L382
L390	100.5	-4.4	-.87	8.6	1.47	130.0	2.0	.32	11.7	1.20	45S	G	L390
L396M	100.8	-4.1	-.81	6.3	1.07	120.5	-7.4	-1.18	9.5	.97	45S	G	L396M
L554	102.9	-2.0	-.40	5.7	.97	135.9	7.9	1.25	6.7	.69	45S	G	L554
L561	111.7	6.7	1.32	7.9	1.36	126.3	-1.6	-.26	8.8	.90	45S	G	L561
L571	108.7	3.7	.73	6.4	1.09	137.0	9.0	1.43	8.0	.82	45S	G	L571
L575	105.4	.5	.09	4.7	.81	128.3	.4	.06	13.0	1.34	45S	G	L575
L587	101.3	-3.6	-.71	5.8	.99	125.7	-2.3	-.36	8.0	.82	45S	G	L587
L597	103.6	-1.3	-.26	5.2	.89	125.5	-2.4	-.39	10.6	1.09	45S	G	L597
L600	108.6	3.7	.72	5.0	.85	134.3	6.3	1.00	6.9	.71	45S	G	L600
L602	101.4	-3.5	-.70	3.3	.56	114.4	-13.6	-2.15	4.4	.45	45S	G	L602
L607	125.0	20.1	3.94	4.1	.70	143.7	15.8	2.50	6.2	.64	45S	X	L607
GR. MEAN = 104.9 SHEFF. UNITS				GRAND MEAN = 128.0 SHEFF. UNITS				TEST DETERMINATIONS = 15					
SD MEANS = 5.1 SHEFF. UNITS				SD OF MEANS = 6.3 SHEFF. UNITS				91 LA8S IN GRAND MEANS					
AVERAGE SDR = 5.9 SHEFF. UNITS				AVERAGE SDR = 9.7 SHEFF. UNITS									
L174	215.5	110.5	21.73	5.5	.94	226.7	98.8	15.64	6.0	.61	45R	*	L174
TOTAL NUMBER OF LABORATORIES REPORTING = 94													
Best Values: E36 105 + 8 Sheffield units													
B91 128 + 10 Sheffield units													

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

MARCH 1978

LAB CGDE	P	MEANS E36	B91	COORDINATES MAJOR	MINOR	AVG R, SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L221 *	*	93.0	122.4	-11.6	6.3	1.10 45S	SMOOTHNESS, SHEFFIELD
L223	G	93.9	118.9	-13.9	3.5	1.07 45S	SMOOTHNESS, SHEFFIELD
L290	G	95.1	114.0	-17.1	-.3	.98 45S	SMOOTHNESS, SHEFFIELD
L226B	G	97.4	117.1	-13.2	-.3	.89 45S	SMOOTHNESS, SHEFFIELD
L166	G	97.5	119.3	-11.3	.9	1.17 45S	SMOOTHNESS, SHEFFIELD
L321 *	*	97.7	112.0	-17.2	-3.6	.88 45S	SMOOTHNESS, SHEFFIELD
L211	G	97.7	120.9	-10.0	1.7	1.18 45S	SMOOTHNESS, SHEFFIELD
L213	G	99.3	126.9	-4.2	3.9	.98 45S	SMOOTHNESS, SHEFFIELD
L349	G	99.4	120.3	-9.4	-.1	1.01 45S	SMOOTHNESS, SHEFFIELD
L288	G	99.5	127.2	-3.9	4.0	1.04 45S	SMOOTHNESS, SHEFFIELD
L132	G	99.5	131.7	-.3	6.6	1.14 45S	SMOOTHNESS, SHEFFIELD
L126	G	99.5	125.7	-5.1	3.0	1.02 45S	SMOOTHNESS, SHEFFIELD
L261	G	99.7	124.9	-5.5	2.4	.95 45S	SMOOTHNESS, SHEFFIELD
L123	G	99.8	126.9	-3.9	3.5	.81 45S	SMOOTHNESS, SHEFFIELD
L150	G	100.0	121.0	-8.5	-.1	1.36 45S	SMOOTHNESS, SHEFFIELD
L233 *	*	100.2	137.7	5.0	9.6	1.03 45S	SMOOTHNESS, SHEFFIELD
L195	G	100.2	121.5	-8.0	.0	1.07 45S	SMOOTHNESS, SHEFFIELD
L257A	G	100.3	121.4	-8.1	-.1	1.04 45S	SMOOTHNESS, SHEFFIELD
L318	G	100.5	123.1	-6.5	.7	.98 45S	SMOOTHNESS, SHEFFIELD
L390	G	100.5	130.0	-1.0	4.8	1.33 45S	SMOOTHNESS, SHEFFIELD
L317	G	100.7	124.1	-5.6	1.1	1.13 45S	SMOOTHNESS, SHEFFIELD
L396M	G	100.8	120.5	-8.4	-.1	1.02 45S	SMOOTHNESS, SHEFFIELD
L370	G	101.0	120.7	-8.2	-.1	.64 45S	SMOOTHNESS, SHEFFIELD
L249	G	101.3	125.8	-3.9	1.7	1.05 45S	SMOOTHNESS, SHEFFIELD
L587	G	101.3	125.7	-4.0	1.5	.91 45S	SMOOTHNESS, SHEFFIELD
L125	G	101.3	121.0	-7.8	-1.2	1.22 45S	SMOOTHNESS, SHEFFIELD
L602	G	101.4	114.4	-13.0	-5.2	.50 45S	SMOOTHNESS, SHEFFIELD
L360	G	102.0	121.5	-7.0	-1.5	.84 45S	SMOOTHNESS, SHEFFIELD
L155	G	102.1	130.1	-.0	3.6	1.15 45S	SMOOTHNESS, SHEFFIELD
L115	G	102.3	131.0	-.9	3.9	1.00 45S	SMOOTHNESS, SHEFFIELD
L124	G	102.6	121.9	-6.3	-1.7	.99 45S	SMOOTHNESS, SHEFFIELD
L278	G	102.7	130.8	1.0	3.5	1.30 45S	SMOOTHNESS, SHEFFIELD
L554	G	102.9	135.9	5.2	6.3	.83 45S	SMOOTHNESS, SHEFFIELD
L378	G	103.1	127.4	-1.6	1.2	1.12 45S	SMOOTHNESS, SHEFFIELD
L190C	G	103.3	129.2	-.0	2.0	1.40 45S	SMOOTHNESS, SHEFFIELD
L134	G	103.3	128.5	-.6	1.6	.77 45S	SMOOTHNESS, SHEFFIELD
L281	G	103.3	125.7	-2.8	-.0	.97 45S	SMOOTHNESS, SHEFFIELD
L382	G	103.6	119.2	-7.9	-4.1	1.11 45S	SMOOTHNESS, SHEFFIELD
L597	G	103.6	125.5	-2.7	-.4	.99 45S	SMOOTHNESS, SHEFFIELD
L275	G	103.7	131.3	2.0	3.0	1.31 45S	SMOOTHNESS, SHEFFIELD
L176S	G	103.8	130.3	1.2	2.3	1.01 45S	SMOOTHNESS, SHEFFIELD
L230S	G	103.9	129.0	-.2	1.5	1.05 45S	SMOOTHNESS, SHEFFIELD
L167	G	104.3	127.0	-1.1	-.1	.58 45S	SMOOTHNESS, SHEFFIELD
L255	X	104.7	111.4	-13.5	-9.6	.47 45S	SMOOTHNESS, SHEFFIELD
L183S	G	104.7	127.7	-.3	.0	.91 45S	SMOOTHNESS, SHEFFIELD
L341	G	104.8	122.1	-4.8	-3.3	.82 45S	SMOOTHNESS, SHEFFIELD
L100	G	105.0	127.7	-.2	-.2	.91 45S	SMOOTHNESS, SHEFFIELD
L575	G	105.4	128.3	-.6	-.2	1.07 45S	SMOOTHNESS, SHEFFIELD
L326	G	105.5	124.0	-2.9	-2.8	.88 45S	SMOOTHNESS, SHEFFIELD
L108	G	105.5	125.9	-1.3	-1.7	.82 45S	SMOOTHNESS, SHEFFIELD
L297	G	105.7	130.7	2.6	1.0	1.05 45S	SMOOTHNESS, SHEFFIELD
L291S	G	105.7	130.6	2.5	1.0	.81 45S	SMOOTHNESS, SHEFFIELD
L232S	G	106.0	131.7	3.6	1.3	1.05 45S	SMOOTHNESS, SHEFFIELD
L366	G	106.2	126.4	-.5	-1.9	.88 45S	SMOOTHNESS, SHEFFIELD
L152	G	106.5	135.2	6.7	3.1	.65 45S	SMOOTHNESS, SHEFFIELD
L121	G	106.5	124.9	-1.5	-3.0	1.17 45S	SMOOTHNESS, SHEFFIELD
L254	G	106.5	133.9	5.7	2.2	1.16 45S	SMOOTHNESS, SHEFFIELD
L328	G	106.6	128.5	1.4	-1.0	.77 45S	SMOOTHNESS, SHEFFIELD
L301	G	106.7	125.4	-1.1	-2.9	.63 45S	SMOOTHNESS, SHEFFIELD
L260	G	106.7	130.3	2.9	0	.58 45S	SMOOTHNESS, SHEFFIELD
L312	G	106.7	120.5	-5.0	-5.9	.81 45S	SMOOTHNESS, SHEFFIELD
L308	G	106.9	133.3	5.4	1.5	.87 45S	SMOOTHNESS, SHEFFIELD
L173B	G	107.0	122.3	-3.3	-5.0	.90 45S	SMOOTHNESS, SHEFFIELD
L122	G	107.2	129.3	2.4	-1.0	1.22 45S	SMOOTHNESS, SHEFFIELD
L157	G	107.3	135.6	7.5	2.6	.91 45S	SMOOTHNESS, SHEFFIELD

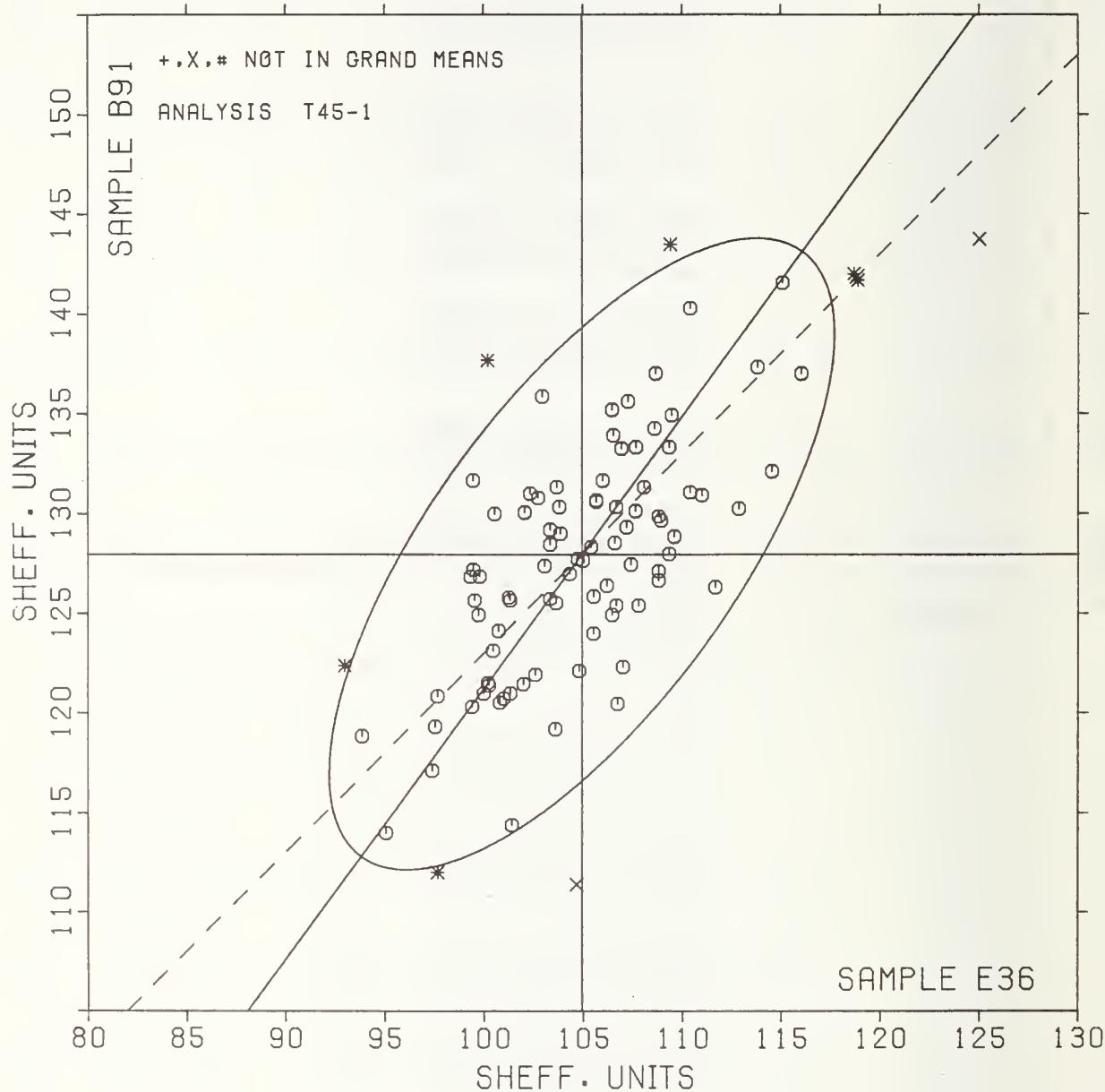
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
SHEFFIELD TESTER IS STANDARD FOR THIS ANALYSIS

MARCH 1978

LAB CODE	MEANS			COORDINATES			AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
	F	E36	B91	MAJOR	MINOR					
L372	G	107.4	127.5	1.0	-2.3	1.27	45S SMOOTHNESS, SHEFFIELD			
L114	G	107.7	130.1	3.4	-.9	.95	45S SMOOTHNESS, SHEFFIELD			
L162	G	107.7	133.3	5.9	1.0	.80	45S SMOOTHNESS, SHEFFIELD			
L228	G	107.8	125.4	-.4	-3.8	1.25	45S SMOOTHNESS, SHEFFIELD			
L203	G	108.1	131.3	4.6	-.5	1.36	45S SMOOTHNESS, SHEFFIELD			
L600	G	108.6	134.3	7.2	.8	.78	45S SMOOTHNESS, SHEFFIELD			
L571	G	108.7	137.0	9.5	2.3	.96	45S SMOOTHNESS, SHEFFIELD			
L128	G	108.8	126.7	1.2	-3.9	.93	45S SMOOTHNESS, SHEFFIELD			
L190R	G	108.8	129.9	3.8	-2.0	1.27	45S SMOOTHNESS, SHEFFIELD			
L352	G	108.8	127.1	1.6	-3.6	1.13	45S SMOOTHNESS, SHEFFIELD			
L139S	G	108.9	129.7	3.7	-2.2	.87	45S SMOOTHNESS, SHEFFIELD			
L323	G	109.3	133.3	6.9	-.4	1.18	45S SMOOTHNESS, SHEFFIELD			
L241	G	109.3	128.0	2.6	-3.5	.75	45S SMOOTHNESS, SHEFFIELD			
L262	*	109.4	143.5	15.1	5.6	.73	45S SMOOTHNESS, SHEFFIELD			
L342	G	109.5	134.9	8.3	.5	.82	45S SMOOTHNESS, SHEFFIELD			
L257B	G	109.6	128.9	3.5	-3.2	1.28	45S SMOOTHNESS, SHEFFIELD			
L231	G	110.4	140.3	13.1	2.9	1.23	45S SMOOTHNESS, SHEFFIELD			
L376	G	110.4	131.1	5.7	-2.6	.91	45S SMOOTHNESS, SHEFFIELD			
L148	G	111.0	130.9	6.0	-3.1	1.07	45S SMOOTHNESS, SHEFFIELD			
L561	G	111.7	126.3	2.7	-6.4	1.13	45S SMOOTHNESS, SHEFFIELD			
L257C	G	112.9	130.3	6.5	-5.0	1.13	45S SMOOTHNESS, SHEFFIELD			
L259	G	113.8	137.3	12.8	-1.6	1.08	45S SMOOTHNESS, SHEFFIELD			
L224	G	114.5	132.1	9.0	-5.3	.75	45S SMOOTHNESS, SHEFFIELD			
L277	G	115.1	141.5	16.9	-.1	.96	45S SMOOTHNESS, SHEFFIELD			
L158	G	116.0	137.0	13.8	-3.6	1.30	45S SMOOTHNESS, SHEFFIELD			
L107	*	118.7	142.0	19.4	-2.8	1.24	45S SMOOTHNESS, SHEFFIELD			
L153	*	118.9	141.7	19.3	-3.1	1.23	45S SMOOTHNESS, SHEFFIELD			
L607	X	125.0	143.7	24.6	-6.8	.67	45S SMOOTHNESS, SHEFFIELD			
L174	*	215.5	226.7	145.0	-30.6	.78	45R SMOOTHNESS, SHEFFIELD, NON-STANDARD INSTRUMENT			
GMEANS:		104.9	128.0			1.00				
95% ELLIFSE:		18.8	7.7			WITH GAMMA = 53 DEGREES				

SMOOTHNESS, SHEFFIELD

SAMPLE E36 = 105. SHEFF. UNITS SAMPLE B91 = 128. SHEFF. UNITS



ANALYSIS T45-2 TABLE 1

SMOOTHNESS, BEKK SECONDS

TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CGDE	SAMPLE E36	WRITING				SAMPLE B91	HEAT SET OPPSET BOOK				TEST D. = 15
		MEAN	DEV	N. DEV	SDR		MEAN	DEV	N. DEV	SDR	
L139B	47.6	2.3	.84	5.2	1.14	50.5	4.3	.87	7.1	1.09	45K G L139B
L162	41.0	-4.3	-1.62	4.8	1.03	35.5	-10.7	-2.16	5.4	.84	45K G L162
L176	35.1	-10.2	-3.81	5.9	1.29	26.7	-19.5	-3.91	3.5	.54	45K # L176
L182K	46.3	1.0	.37	3.0	.65	51.4	5.2	1.04	5.8	.89	45K G L182K
L190C	46.2	.9	.32	5.5	1.19	46.6	.4	.08	5.6	.87	45K G L190C
L230B	48.7	3.4	1.26	3.9	.85	46.7	.5	.10	7.0	1.07	45K G L230B
L232B	41.5	-3.8	-1.42	3.5	.77	41.4	-4.8	-0.96	6.8	1.04	45K G L232B
L243K	43.9	-1.4	-.53	3.9	.84	48.4	2.2	.44	5.3	.81	45K G L243K
L291K	47.4	2.0	.75	6.1	1.32	46.1	-.1	-.01	7.2	1.12	45K G L291K
L581	45.4	.1	.02	5.6	1.22	49.2	3.0	.60	8.3	1.28	45K G L581
GR. MEAN = 45.3 BEKK SECONDS						GRAND MEAN = 46.2 BEKK SECONDS					TEST DETERMINATIONS = 15
SD MEANS = 2.7 BEKK SECONDS						SD GP MEANS = 5.0 BEKK SECONDS					9 LABS IN GRAND MEANS
AVERAGE SDR = 4.6 BEKK SECONDS						AVERAGE SDR = 6.5 BEKK SECONDS					
L182G	141.7	96.3	35.89	11.9	2.57	102.7	56.5	11.35	12.5	1.93	45H * L182G
L250M	45.7	.4	.14	4.3	.94	61.1	14.9	2.99	11.4	1.76	45L * L250M
L251	43.5	-1.8	-.68	3.3	.71	42.4	-3.8	-.77	5.1	.78	45L * L251
L388	680.4	635.0	236.59	90.0	19.49	500.8	454.6	91.35	63.8	9.82	45H * L388
TOTAL NUMBER OF LABORATORIES REPORTING = 14											
Best Values: E36 45 Bekk seconds						B91 47 Bekk seconds					

The following laboratories were omitted from the grand means because of extreme test results: 176.

ANALYSIS T45-2 TABLE 2

SMOOTHNESS, BEKK SECONDS

TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CGDE	P	MEANS		COORDINATES		AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		E36	B91	MAJOR	MINOR			
L176	#	35.1	26.7	-21.9	1.4	.92	45K	SMOOTHNESS, BEKK
L162	G	41.0	35.5	-11.6	-.4	.93	45K	SMOOTHNESS, BEKK
L232B	G	41.5	41.4	-5.9	1.5	.90	45K	SMOOTHNESS, BEKK
L251	*	43.5	42.4	-4.2	.1	.75	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L243K	G	43.9	48.4	1.4	2.2	.83	45K	SMOOTHNESS, BEKK
L581	G	45.4	49.2	2.7	1.2	1.25	45K	SMOOTHNESS, BEKK
L250M	*	45.7	61.1	13.7	5.7	1.35	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L190C	G	46.2	46.6	.7	-.6	1.03	45K	SMOOTHNESS, BEKK
L182K	G	46.3	51.4	5.1	1.2	.77	45K	SMOOTHNESS, BEKK
L291K	G	47.4	46.1	.8	-1.9	1.22	45K	SMOOTHNESS, BEKK
L139B	G	47.6	50.5	4.9	-.3	1.11	45K	SMOOTHNESS, BEKK
L230B	G	48.7	46.7	1.9	-2.9	.96	45K	SMOOTHNESS, BEKK
L192G	*	141.7	102.7	90.9	-64.8	2.25	45H	GURLEY OIL FLSTATION
L388	*	680.4	500.8	674.5	-393.6	14.66	45H	GURLEY OIL PLSTATION
GMEANS:		45.3	46.2			1.00		
95% ELLIPSE:		17.8	5.5			WITH GAMMA = 65 DEGREES		

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T47-1 TABLE 1
SMOOTHNESS, BENDTSEN

MARCH 1978

LAB CODE	SAMPLE E36	WRITING					SAMPLE B91	HEAT SET OFFSET BOOK					TEST D. = 10		
		MEAN	DEV	N. DEV	SDR	R. BDR		MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	101.7	.2	.14	7.9	.76		111.7	-10.0	+1.13	8.9	.65	47B	G	L100	
L176	103.6	2.1	1.69	3.7	.35		107.2	-14.5	+1.63	4.4	.32	47B	G	L176	
L182B	101.6	.1	.06	8.2	.79		119.0	-2.7	-.31	11.3	.82	47B	G	L182B	
L236	115.5	14.0	11.40	15.5	1.49		147.2	25.5	2.86	14.7	1.07	47B	#	L236	
L242	99.9	-1.6	-1.33	13.8	1.33		124.2	2.5	.28	11.2	.81	47B	G	L242	
L243B	101.2	-.3	-.27	19.9	1.92		130.5	8.8	.98	20.8	1.52	47B	G	L243B	
L244	100.1	-1.4	-1.16	10.0	.96		120.6	-1.1	-.13	19.9	1.45	47B	G	L244	
L280	83.8	-17.7	-14.46	12.0	1.16		142.1	20.4	2.29	31.6	2.30	47B	#	L280	
L333	101.4	-.1	-.10	9.5	.92		131.0	9.3	1.04	19.4	1.41	47B	G	L333	
L484	102.7	1.2	.96	10.1	.97		129.8	8.1	.90	14.0	1.02	47B	G	L484	

GR. MEAN = 101.5 ML/MIN

SD MEANS = 1.2 ML/MIN

GRAND MEAN = 121.7 ML/MIN

SD OF MEANS = 8.9 ML/MIN

TEST DETERMINATIONS = 10

AVERAGE SDR = 10.4 ML/MIN

AVERAGE SDR = 13.7 ML/MIN

TOTAL NUMBER OF LABORATORIES REPORTING = 10

Best Values: E36 101 milliliter per minute

B91 122 milliliter per minute

The following laboratories were omitted from the grand means because of extreme test results: 236,
280.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T47-1 TABLE 2
SMOOTHNESS, BENDTSEN

MARCH 1978

LAB CODE	F	MEANS E36	MEANS B91	COORDINATES	Avg	PROPERTY---TEST INSTRUMENT---CONDITIONS
MAJOR	MINOR	E.SDR	VAR			
L280	#	83.8	142.1	-21.3 -16.6	1.73 47B	SMOOTHNESS, BENDTSEN, WG 150
L242	G	99.9	124.2	-2.5 -1.5	1.07 47B	SMOOTHNESS, BENDTSEN, WG 150
L244	G	100.1	120.6	1.1 -1.5	1.21 47B	SMOOTHNESS, BENDTSEN, WG 150
L243B	G	101.2	130.5	-8.8 .1	1.72 47B	SMOOTHNESS, BENDTSEN, WG 150
L333	G	101.4	131.0	-9.2 .4	1.16 47B	SMOOTHNESS, BENDTSEN, WG 150
L182B	G	101.6	119.0	2.8 -.1	.81 47B	SMOOTHNESS, BENDTSEN, WG 150
L100	G	101.7	111.7	10.0 -.4	.70 47B	SMOOTHNESS, BENDTSEN, WG 150
L484	G	102.7	129.8	-8.0 1.6	1.00 47B	SMOOTHNESS, BENDTSEN, WG 150
L176	G	103.6	107.2	14.6 1.3	.34 47B	SMOOTHNESS, BENDTSEN, WG 150
L236	#	115.5	147.2	-24.7 15.3	1.28 47B	SMOOTHNESS, BENDTSEN, WG 150

GMSEANS: 101.5 121.7

95% ELLIPSE: 30.9 3.9 WITH GAMMA = 86 DEGREES

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS TS5-1 TABLE 1
K & N INK ABSORPTION

MARCH 1978

LAB CODE	SAMPLE H80	PRINTING					SAMPLE H58	PRINTING					TEST D. = 4 VAR F LAB
		MEAN	DEV	N.DEV	SDR	R.SDR		MEAN	DEV	N.DEV	SDR	R.SDR	
L126	62.4	-3.6	.72	.5	.85	.5	60.6	-3.8	.68	.3	.61	.56	K Ø L126
L149	58.0	-8.0	-1.60	.0	.00	.0	56.7	-7.6	-1.39	.5	1.17	.56	K Ø L149
L182	64.8	-1.1	.23	.5	.97	.5	63.1	-1.3	.24	.2	.40	.56	K Ø L182
L213	72.6	6.6	1.33	1.0	1.94	1.0	71.2	6.9	1.25	.7	1.53	.56	K Ø L213
L277	71.5	5.5	1.12	.6	1.07	.6	68.5	4.1	.75	.6	1.35	.56	K Ø L277
L278	67.4	1.4	.28	.7	1.21	.7	69.5	5.1	.93	.2	.43	.56	K Ø L278
L291	68.5	2.6	.52	.7	1.33	.7	67.1	2.8	.51	.2	.56	.56	K Ø L291
L339	26.6	-39.4	-7.93	.2	.37	.2	26.7	-37.6	-6.85	.5	1.17	.56	# L339
L388	62.5	-3.5	-.70	.3	.62	.3	58.1	-6.2	-1.13	.8	1.97	.56	K Ø L388
GR. MEAN = 66.0 K & N UNITS							GRAND MEAN = 64.4 K & N UNITS						TEST DETERMINATIONS = 4
SD MEANS = 5.0 K & N UNITS							SD OF MEANS = 5.5 K & N UNITS						8 LABS IN GRAND MEANS
AVERAGE SDR = .5 K & N UNITS							AVERAGE SDR = .4 K & N UNITS						
TOTAL NUMBER OF LABORATORIES REPORTING = 9													

Best Values: H80 66 K & N units
H58 64 K & N units

The following laboratories were omitted from the grand means because of extreme test results: 339.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS TS6-1 TABLE 2
K & N INK ABSORPTION

MARCH 1978

LAB CODE	F	MEANS		COORDINATES		AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		H80	H58	MAJOR	MINOR		TEST	INSTRUMENT	CONDITIONS
L339	#	26.6	26.7	-54.3	4.1	.77	56K INK ABSORPTION, K&N INK TEST		
L149	Ø	58.0	56.7	-11.0	.8	.58	56K INK ABSORPTION, K&N INK TEST		
L126	Ø	62.4	60.6	-5.2	.2	.73	56K INK ABSORPTION, K&N INK TEST		
L388	Ø	62.5	58.1	-6.9	-1.6	1.29	56K INK ABSORPTION, K&N INK TEST		
L182	Ø	64.8	63.1	-1.7	-.0	.69	56K INK ABSORPTION, K&N INK TEST		
L278	Ø	67.4	69.5	4.8	2.4	.82	56K INK ABSORPTION, K&N INK TEST		
L291	Ø	68.5	67.1	3.8	-.1	.94	56K INK ABSORPTION, K&N INK TEST		
L277	Ø	71.5	68.5	6.8	-1.4	1.21	56K INK ABSORPTION, K&N INK TEST		
L213	Ø	72.6	71.2	9.5	-.3	1.73	56K INK ABSORPTION, K&N INK TEST		
GMEANS:		66.0	64.4			1.00			
95% ELLIPSE:		25.3	4.3			WITH GAMMA = 48 DEGREES			

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T57-1 TABLE 1
 HYDROGEN ION CONCENTRATION (PH), COLD
 TAPPI STANDARD T509 GS-77

MARCH 1978

LAB CODE	SAMPLE	PRINTING					SAMPLE	PRINTING					TEST D. =	S		
	J17	93 GRAMS PER SQUARE METER	MEAN	DEV	N. DEV	SDR	R. SDR	J61	86 GRAMS PER SQUARE METER	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	P
L174C	5.040	.275	1.52	.055	1.06	5.240	.382	8.16	.055	.86	57F	#	L174C			
L182C	4.720	-.045	-.25	.045	.67	5.640	.018	.39	.055	.86	57D	G	L182C			
L251C	4.674	-.091	-.50	.034	.65	5.556	-.066	-1.40	.042	.66	57P	G	L251C			
L328	4.550	-.215	-1.19	.050	.97	5.590	-.032	-.68	.089	1.40	57M	G	L328			
L356	4.860	.095	.53	.020	.39	5.662	.040	.86	.044	.69	57V	G	L356			
L484A	5.020	.255	1.41	.110	2.12	5.660	.038	.82	.089	1.40	57Y	G	L484A			
GR. MEAN = 4.765 PH UNITS						GRAND MEAN = 5.622 PH UNITS					TEST DETERMINATIONS = 5					
SD MEANS = .181 PH UNITS						SD OF MEANS = .047 PH UNITS					5 LABS IN GRAND MEANS					
AVERAGE SDR = .052 PH UNITS						AVERAGE SDR = .064 PH UNITS										
L442	4.093	-.672	-3.72	.072	1.39	4.845	-.776	-16.60	.174	2.72	57Q	*	L442			
TOTAL NUMBER OF LABORATORIES REPORTING = 7																
Best Values: J17 4.7 pH units																
J61 5.6 pH units																

The following laboratories were omitted from the
 grand means because of extreme test results: 174C.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T57-1 TABLE 2
 HYDROGEN ION CONCENTRATION (PH), COLD
 TAPPI STANDARD T509 GS-77

MARCH 1978

LAB CODE	F	MEANS		COORDINATES		AVG	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		J17	J61	MAJOR	MINOR							
L442	*	4.093	4.845	-.812	-.628	2.06	57Q PH, HGT, W.G.PYE					
L328	G	4.550	5.590	-.217	.011	1.18	57M PH, COLD, BECKMAN ZEROMATIC					
L251C	G	4.674	5.556	-.102	-.046	.66	57P PH, COLD, RADIGMETER TYPE PH M64					
L182C	G	4.720	5.640	-.040	.027	.86	57D PH, COLD, RADIGMETER TYPE PH M 28					
L356	G	4.860	5.662	-.101	.021	.54	57V PH, COLD, BECKMAN EXPANDOMATIC					
L484A	G	5.020	5.660	.258	-.013	1.76	57Y PH, COLD, BECKMAN MODEL H2					
L174C	#	5.040	5.240	.194	-.428	.96	57P PH, COLD, FISHER ACCUMET MODEL 220					
GMEANS:		4.765	5.622			1.00						
95% ELLIPSE:				.930	.151		WITH GAMMA = 11 DEGREES					

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T57-2 TABLE 1
 HYDROGEN ION CONCENTRATION (PH), HOT
 TAPPI STANDARD T435 GS-77

MARCH 1978

LAB CODE	SAMPLE MEAN	PRINTING 93 GRAMS PER SQUARE METER					SAMPLE MEAN	PRINTING 86 GRAMS PER SQUARE METER					TEST D.*	5
		DEV	N. DEV	SDR	R. SDR			DEV	N. DEV	SDR	R. SDR			
L128	4.20	.18	-1.27	.00	.00		4.86	.28	-1.18	.05	.56	57L	M	L128
L131	4.56	.18	1.23	.15	2.14		5.34	.20	.85	.13	1.36	57L	M	L131
L162	4.27	.11	-0.77	.04	.58		4.88	.26	-1.09	.03	.33	57C	G	L162
L174H	5.16	.78	5.40	.13	1.89		5.28	.14	.60	.13	1.33	57G	#	L174H
L182H	4.34	-.04	-0.30	.05	.77		5.08	-.06	-.25	.04	.45	57E	G	L182H
L334	4.39	.00	.02	.06	.90		5.25	.11	.47	.19	1.97	57C	G	L334
L484B	4.54	.16	1.09	.11	1.61		5.42	.28	1.19	.13	1.33	57Z	G	L484B
GR. MEAN =	4.38 PH UNITS						GRAND MEAN =	5.14 PH UNITS				TEST DETERMINATIONS =	5	
SD MEANS =	.14 PH UNITS						SD OF MEANS =	.24 PH UNITS				6 LABS IN GRAND MEANS		
AVERAGE SDR =	.07 PH UNITS						AVERAGE SDR =	.10 PH UNITS						
TOTAL NUMBER OF LABORATORIES REPORTING =	7													

Best Values: J17 4.4 pH units
 J61 5.2 pH units

The following laboratories were omitted from the grand means because of extreme test results: 174H.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T57-2 TABLE 2
 HYDROGEN ION CONCENTRATION (PH), HOT
 TAPPI STANDARD T435 GS-77

MARCH 1978

LAB CODE	F	MEANS J17	MEANS J61	COORDINATES MAJOR	COORDINATES MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L128	G	4.20	4.86	.33	.02	.28	57L PH, HOT, L+N	
L162	G	4.27	4.88	-.28	-.04	.46	57C PH, HOT, CORNING MODEL 12 RESEARCH METER	
L182H	G	4.34	5.08	-.07	.01	.61	57E PH, HOT, RADIOMETER TYPE PH M 28	
L334	G	4.39	5.25	.10	.05	1.43	57C PH, HOT, CORNING MODEL 12 RESEARCH METER	
L484B	G	4.54	5.42	.32	.01	1.47	57Z PH, HOT, BECKMAN MODEL H2	
L151	G	4.56	5.34	.26	-.05	1.75	57L PH, HOT, L+N	
L174H	#	5.16	5.28	.52	-.60	1.61	57G PH, HOT, FISHER ACCUMET MODEL 220	
GMEANS:		4.38	5.14			1.00		
95% ELLIPSE:		1.14	.16			WITH GAMMA = 59 DEGREES		

TAPPI STANDARD T425 65-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE E50 MEAN	OFFSET PRINTING				SAMPLE H51 MEAN	PRINTING				TEST D. = 10		
		96 GRAMS PER SQUARE METER	DEV	N.DEV	SDR		91 GRAMS PER SQUARE METER	DEV	N.DEV	SDR	R.SDR	VAR	F
L105	92.58	.29	.51	.93	1.80	91.17	.99	1.80	.93	2.43	60B	0	L105
L108	92.58	.29	.51	.39	.76	90.30	.12	.21	.27	.72	60B	0	L108
L115	93.05	.76	1.34	.43	.84	90.71	.53	.96	.29	.76	60B	0	L115
L118	92.02	-.27	-.49	.68	1.32	90.81	.63	1.15	.22	.58	60B	0	L118
L121	92.20	-.09	-.17	.90	1.76	90.50	.32	.58	.26	.68	60B	0	L121
L122	91.84	-.45	-.81	.67	1.30	90.07	-.11	-.21	.37	.97	60D	0	L122
L123	92.28	-.01	-.02	.79	1.54	89.96	-.22	-.41	.42	1.10	60W	0	L123
L124	91.99	-.30	-.54	.72	1.40	89.60	-.58	-.106	.42	1.09	60B	0	L124
L125	92.53	.24	.42	.51	.99	89.75	-.43	-.79	.42	1.10	60B	0	L125
L131	92.02	-.27	-.49	.30	.59	89.57	-.61	-.112	.31	.80	60B	0	L131
L132	91.80	-.49	-.88	.52	1.01	89.75	-.43	-.79	.35	.91	60B	0	L132
L134	93.54	1.25	2.22	.23	.45	91.33	1.15	2.09	.29	.76	60B	0	L134
L136	92.95	.66	1.17	.53	1.02	90.13	-.05	-.10	.21	.54	60H	0	L136
L139	92.39	.10	.17	.46	.89	89.90	-.28	-.52	.22	.58	60R	0	L139
L148R	92.02	-.27	-.49	.27	.53	90.27	-.09	-.16	.45	1.17	60H	0	L148R
L150	92.75	.46	.81	.49	.94	90.35	.17	.31	.41	1.07	60B	0	L150
L152	92.69	.40	.70	.49	.95	90.39	.21	.38	.32	.85	60B	0	L152
L153	90.86	-1.43	-2.55	.74	1.43	88.00	-2.18	-3.99	.62	1.62	60B	X	L153
L157	92.95	.66	1.17	.60	1.16	90.60	.42	.76	.46	1.20	60H	0	L157
L158	93.06	.77	1.36	.67	1.31	90.23	.05	.09	.39	1.02	60D	0	L158
L159	92.80	.51	.90	.25	.48	90.25	.07	.12	.22	.58	60R	0	L159
L162	92.88	.59	1.04	.23	.45	90.93	.75	1.36	.33	.85	60W	0	L162
L166	91.72	-.57	-1.02	.46	.90	88.76	-1.42	-2.60	.32	.82	60B	*	L166
L172	92.72	.43	.76	.49	.95	90.48	.30	.54	.26	.68	60B	0	L172
L173A	91.67	-.62	-1.11	.64	1.25	89.78	-.40	-.74	.23	.61	60B	0	L173A
L182	92.60	.31	.54	.46	.89	89.80	-.38	-.70	.42	1.10	60B	0	L182
L183	92.22	-.07	-.13	.28	.55	90.20	.02	.03	.27	.70	60B	0	L183
L190C	92.90	.61	1.08	.39	.77	90.12	-.06	-.11	.34	.88	60B	0	L190C
L190R	92.92	.63	1.11	.36	.71	90.14	-.04	-.08	.38	1.00	60B	0	L190R
L206	92.50	.21	.37	.41	.79	89.92	-.26	-.48	.36	.93	60B	0	L206
L210B	92.70	.41	.72	.49	.95	90.27	.09	.16	.35	.92	60B	0	L210B
L210D	92.61	.32	.56	.51	.98	90.02	-.16	-.30	.35	.92	60D	0	L210D
L211S	92.12	-.17	-.31	.45	.87	89.69	-.49	-.50	.31	.80	60R	0	L211S
L213	92.39	.10	.17	.51	.99	90.52	.35	.63	.68	1.78	60B	0	L213
L223B	92.87	.58	1.02	.19	.37	90.21	.03	.05	.26	.68	60B	0	L223B
L225	93.10	.81	1.43	.70	1.36	91.45	1.27	2.31	.60	1.55	60B	0	L225
L226B	93.05	.74	1.31	.76	1.48	90.46	.28	.51	.35	.91	60B	0	L226B
L228	92.77	.48	.85	.50	.98	89.77	-.41	-.75	.38	.99	60B	0	L228
L230	92.90	.61	1.08	.42	.81	90.54	.36	.65	.31	.82	60B	0	L230
L233B	92.70	.41	.72	.75	1.46	90.30	.12	.21	.35	.91	60B	0	L233B
L236B	91.88	-.41	-.74	.84	1.63	89.40	-.78	-.143	.63	1.55	60B	0	L236B
L238A	92.24	-.05	-.10	.35	.68	89.06	-1.12	-2.05	.38	.99	60R	*	L238A
L241	93.04	.75	1.33	.57	1.11	90.76	.58	1.05	.55	1.44	60B	0	L241
L243	92.47	.18	.31	.52	1.00	90.30	.12	.21	.42	1.09	60R	0	L243
L254	92.10	-.19	-.34	.42	.81	90.00	-.18	-.33	.19	.51	60H	0	L254
L255	92.25	-.04	-.08	.27	.53	90.28	.10	.18	.25	.65	60B	0	L255
L259	92.64	.35	.62	.34	.67	90.57	.39	.71	.34	.89	60B	0	L259
L261	93.45	1.20	2.13	.51	.98	91.30	1.12	2.04	.39	1.03	60B	0	L261
L262	92.42	.13	.22	.21	.41	89.99	-.19	-.35	.11	.29	60R	0	L262
L275	92.66	.37	.65	.28	.54	90.34	.16	.29	.16	.43	60R	0	L275
L278	91.32	-.97	-1.73	.48	.94	89.91	-.27	-.50	.38	.99	60B	0	L278
L281	92.29	-.00	-.01	.62	1.20	90.04	-.14	-.26	.30	.77	60D	0	L281
L288	92.78	.49	.86	.51	.99	90.79	.61	1.11	.34	.99	60D	0	L288
L301	91.91	-.38	-.68	.42	.82	89.56	-.62	-.14	.24	.62	60B	0	L301
L308	92.30	.01	.01	.49	.95	90.42	.24	.43	.43	1.12	60R	0	L308
L315	93.01	.72	1.28	.41	.79	90.35	.17	.31	.33	.87	60D	0	L315
L317	92.58	.29	.51	.53	1.04	90.83	.65	1.18	.74	1.92	60B	0	L317
L318	92.00	-.29	-.52	.62	1.21	90.10	-.08	-.15	.29	1.03	60B	0	L318
L323	92.48	.19	.33	.68	1.33	90.39	.21	.38	.33	.86	60W	0	L323
L326	92.36	.07	.12	.55	1.07	91.25	1.07	1.95	.36	.92	60B	0	L326
L328	91.30	-.99	-1.77	.82	1.60	88.60	-.58	-.289	.46	1.20	60B	*	L328
L333	91.92	.37	.66	.96	1.88	90.05	-.13	-.24	.76	1.99	60B	0	L333
L339	91.35	-.94	-1.68	.78	1.52	89.80	-.38	-.70	1.25	3.26	60B	0	L334
L341	90.24	-2.05	-3.65	.33	.64	88.77	-.41	-.258	.21	.55	60R	X	L341
L349	92.45	.16	.28	.40	.77	90.40	.22	.40	.31	.81	60D	0	L349

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T60-1 TABLE 1
OPACITY (89% REFLECTANCE BACKING) IN PERCENT
TAPPI STANDARD T425 GS-75. OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CGDE	SAMPLE	OFFSET PRINTING				SAMPLE	PRINTING				TEST D. = 10		
		E50 MEAN	96 GRAMS PER SQUARE METER DEV	N. DEV	SDR		H51 MEAN	91 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R.SDR	VAR	F
L352	91.20	-1.09	-1.94	.29	.56	89.47	-1.71	-1.30	.27	.71	60R	6	L352
L354	91.00	-1.29	-2.30	.47	.92	89.60	-1.58	-1.06	.52	1.34	60B	6	L354
L366	91.90	-1.39	-1.70	.74	1.43	90.02	-1.16	-1.30	.49	1.29	60B	6	L366
L378	92.53	.24	.42	.29	.57	91.28	1.10	2.00	.38	1.00	60D	6	L378
L390	91.79	-1.50	-1.90	.60	1.17	89.95	-1.23	-1.43	.49	1.26	60B	6	L390
L502D	91.50	-1.79	-1.40	.58	1.12	89.97	-1.21	-1.38	.36	.93	60D	6	L502D
L502H	92.39	.10	.18	.41	.80	90.83	.65	1.18	.40	1.04	60B	6	L502H
L502R	91.78	-1.51	-1.91	.36	.70	90.27	.09	.17	.29	.76	60R	6	L502R
L523	91.64	-1.65	-1.16	.34	.66	89.99	-1.19	-1.35	.38	.99	60R	6	L523
L543	91.31	-1.98	-1.75	.46	.90	89.49	-1.69	-1.27	.44	1.15	60D	6	L543
L561	91.40	-1.89	-1.59	.70	1.36	90.00	-1.18	-1.33	.47	1.23	60B	6	L561
L581	92.03	-2.26	-1.47	.56	1.09	90.62	.44	.80	.34	.89	60B	6	L581
L587	91.86	-1.43	-1.77	.58	1.12	90.37	.19	.34	.34	.89	60B	6	L587
L592	91.51	-1.78	-1.39	.51	.99	89.40	-1.78	-1.43	.14	.37	60W	6	L592
L594	92.07	-2.22	-1.40	.56	1.08	90.27	.09	.16	.18	.48	60D	6	L594
L597	91.50	-1.79	-1.41	.97	1.89	90.10	-1.08	-1.15	.84	2.20	60B	6	L597
L599	92.35	.06	.10	.53	1.03	90.45	.27	.49	.37	.96	60B	6	L599
L602	91.40	-1.89	-1.59	.38	.74	89.23	-1.95	-1.74	.23	.60	60B	6	L602
L608	93.72	1.43	2.54	.44	.86	92.21	2.03	3.70	.33	.87	60D	X	L608
GR. MEAN = 92.29 PERCENT				GRAND MEAN = 90.18 PERCENT				TEST DETERMINATIONS = 10					
SD MEANS = .56 PERCENT				SD GF MEANS = .55 PERCENT				81 LABS IN GRAND MEANS					
AVERAGE SDR = .51 PERCENT				AVERAGE SDR = .38 PERCENT									
L100	92.14	-1.15	-1.27	.35	.67	90.46	.28	.51	.28	.72	60B	6	L100
L224	93.10	.81	1.43	.32	.61	90.95	.77	1.40	.55	1.43	60P	6	L224
L232	92.35	.06	.10	.53	1.03	88.40	-1.78	-3.26	.57	1.48	60P	6	L232
L236E	92.69	.40	.70	.32	.63	90.32	.14	.25	.39	1.01	60E	6	L236E
L249	92.76	.47	.83	.46	.89	90.49	.31	.56	.30	.78	60P	6	L249
L255	92.47	.18	.32	.46	.90	90.21	.03	.05	.29	.76	60N	6	L255
L260	92.45	.16	.28	.37	.72	89.70	-1.48	-1.88	.26	.67	60P	6	L260
L277	8.70	-83.59	-148.61	1.06	2.06	10.70	-79.48	-145.15	1.83	4.76	60P	6	L277
L309	91.72	-1.57	-1.02	.29	.56	88.89	-1.29	-2.36	.27	.70	60A	6	L309
L312	91.20	-1.09	-1.94	.35	.68	89.20	-1.98	-1.80	.59	1.53	60P	6	L312
L314	92.74	.45	.79	.46	.90	90.82	.64	1.16	.40	1.05	60T	6	L314
L388	91.10	-1.19	-2.12	.52	1.00	89.15	-1.03	-1.89	.63	1.63	60P	6	L388
TOTAL NUMBER OF LABORATORIES REPORTING = 96													

Best Values: E50 92.3 + 0.9 percent
H51 90.2 + 1.0 percent

ANALYSIS T60-1 TABLE 2

OPACITY (89% RHPLHCTANCH BACKING) IN PERCENT

TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DEG./DIFFPUSH, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		R. SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		E50	B51	MAJOR	MINOR		
L277	+	8.70	10.70	-115.35	.48	3.41	60P OPACITY (WHITE BACKING), PHOTOVOLT
L341	X	90.24	88.77	-2.46	.40	.59	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L153	X	90.86	88.00	-2.55	-.58	1.53	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L354	G	91.00	89.60	-1.34	.47	1.13	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L388	+	91.10	89.15	-1.58	.08	1.32	60P OPACITY (WHITE BACKING), PHOTOVOLT
L352	G	91.20	89.47	-1.28	.24	.63	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L312	+	91.20	89.20	-1.47	.05	1.10	60P OPACITY (WHITE BACKING), PHOTOVOLT
L328	*	91.30	88.60	-1.81	-.46	1.40	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L543	G	91.31	89.49	-1.19	.18	1.02	60D OPACITY (WHITE BACKING), DIANG/BNL
L278	G	91.32	89.91	-.89	.48	.97	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L339	G	91.35	89.80	-.95	.38	2.39	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L602	G	91.40	89.23	-1.30	-.07	.67	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L561	G	91.40	90.00	-.77	.49	1.29	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L597	G	91.50	90.10	-.63	.49	2.04	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L502D	G	91.50	89.97	-.71	.40	1.02	60D OPACITY (WHITE BACKING), DIANG/BNL
L592	G	91.51	89.40	-1.11	-.02	.68	60W OPACITY (WHITE BACKING), HUYGEN,DIGITAL
L523	G	91.64	89.99	-.61	.31	.82	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L173A	G	91.67	89.78	-.73	.14	.93	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L309	*	91.72	88.89	-1.31	-.54	.63	60A OPACITY (WHITE BACKING), ZEISS HLREPFG, FILTER 4.86% BACKING
L166	*	91.72	88.76	-1.40	-.63	.86	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L502R	G	91.78	90.27	-.31	.42	.73	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L390	G	91.79	89.95	-.52	.18	1.22	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L132	G	91.80	89.75	-.66	.03	.96	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L122	G	91.84	90.07	-.41	.23	1.13	60D OPACITY (WHITE BACKING), DIANG/BNL
L587	G	91.86	90.37	-.18	.44	1.00	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L235B	G	91.88	89.40	-.84	-.28	1.64	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L366	G	91.90	90.02	-.40	.15	1.36	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L301	G	91.91	89.56	-.71	-.18	.72	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L333	G	91.92	90.05	-.36	.16	1.93	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L124	G	91.99	89.60	-.62	-.21	1.25	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L318	G	92.00	90.10	-.27	.14	1.12	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L118	G	92.02	90.81	-.24	.64	.95	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L148H	G	92.02	90.27	-.14	.25	.85	60B OPACITY (WHITE BACKING), HUYGEN
L131	G	92.02	89.57	-.62	-.25	.69	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L581	G	92.03	90.62	-.11	.50	.99	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L594	G	92.07	90.27	-.10	.22	.78	60D OPACITY (WHITE BACKING), DIANG/BNL
L254	G	92.10	90.00	-.27	.00	.66	60H OPACITY (WHITE BACKING), HUYGEN
L211S	G	92.12	89.69	-.47	-.24	.83	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L100	*	92.14	90.46	.08	.31	.70	60H OPACITY (WHITE BACKING), ZEISS HLREPFG, PMY-C(10) FILTER
L121	G	92.20	90.50	.15	.29	1.22	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L183	G	92.22	90.20	-.04	.06	.63	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L238A	*	92.24	89.06	-.82	-.77	.84	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L255	G	92.25	90.28	-.04	.10	.59	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L123	G	92.28	89.96	-.16	-.15	1.32	60W OPACITY (WHITE BACKING), HUYGEN,DIGITAL
L281	G	92.29	90.04	-.10	-.10	.99	60D OPACITY (WHITE BACKING), DIANG/BNL
L308	G	92.30	90.42	.17	.17	1.03	60H OPACITY (WHITE BACKING), HUYGEN
L232	*	92.35	88.40	-1.19	-1.33	1.25	60P OPACITY (WHITE BACKING), PHOTOVOLT
L599	G	92.35	90.45	.23	.15	1.00	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L326	G	92.36	91.25	.76	.72	1.00	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L139	G	92.39	89.90	-.13	-.27	.73	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L213	G	92.39	90.53	.31	.18	1.39	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L502B	G	92.39	90.83	.52	.40	.92	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L252	G	92.42	89.99	-.04	-.23	.35	60R OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L260	*	92.45	89.70	-.22	-.46	.69	60P OPACITY (WHITE BACKING), PHOTOVOLT
L349	G	92.45	90.40	.26	.05	.79	60D OPACITY (WHITE BACKING), DIANG/BNL
L243	G	92.47	90.30	.21	-.04	1.05	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L256	*	92.47	90.21	.15	-.10	.83	60N OPACITY (WHITE BACKING), HUNTER
L323	G	92.48	90.39	.28	.02	1.10	60W OPACITY (WHITE BACKING), HUYGEN,DIGITAL
L206	G	92.50	89.92	-.03	-.33	.86	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L125	G	92.53	89.75	-.13	-.48	1.04	60H OPACITY (WHITE BACKING), HUYGEN
L378	G	92.53	91.28	.93	.63	.78	60D OPACITY (WHITE BACKING), DIANG/BNL
L105	G	92.58	91.17	.89	.51	2.11	60H OPACITY (WHITE BACKING), HUYGEN
L317	G	92.58	90.83	.65	.27	1.48	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L108	G	92.58	90.30	.29	-.11	.74	60B OPACITY (WHITE BACKING), BAUSCH + LOMB
L182	G	92.60	89.80	-.04	-.49	1.00	60B OPACITY (WHITE BACKING), BAUSCH + LOMB

ANALYSIS T60-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT

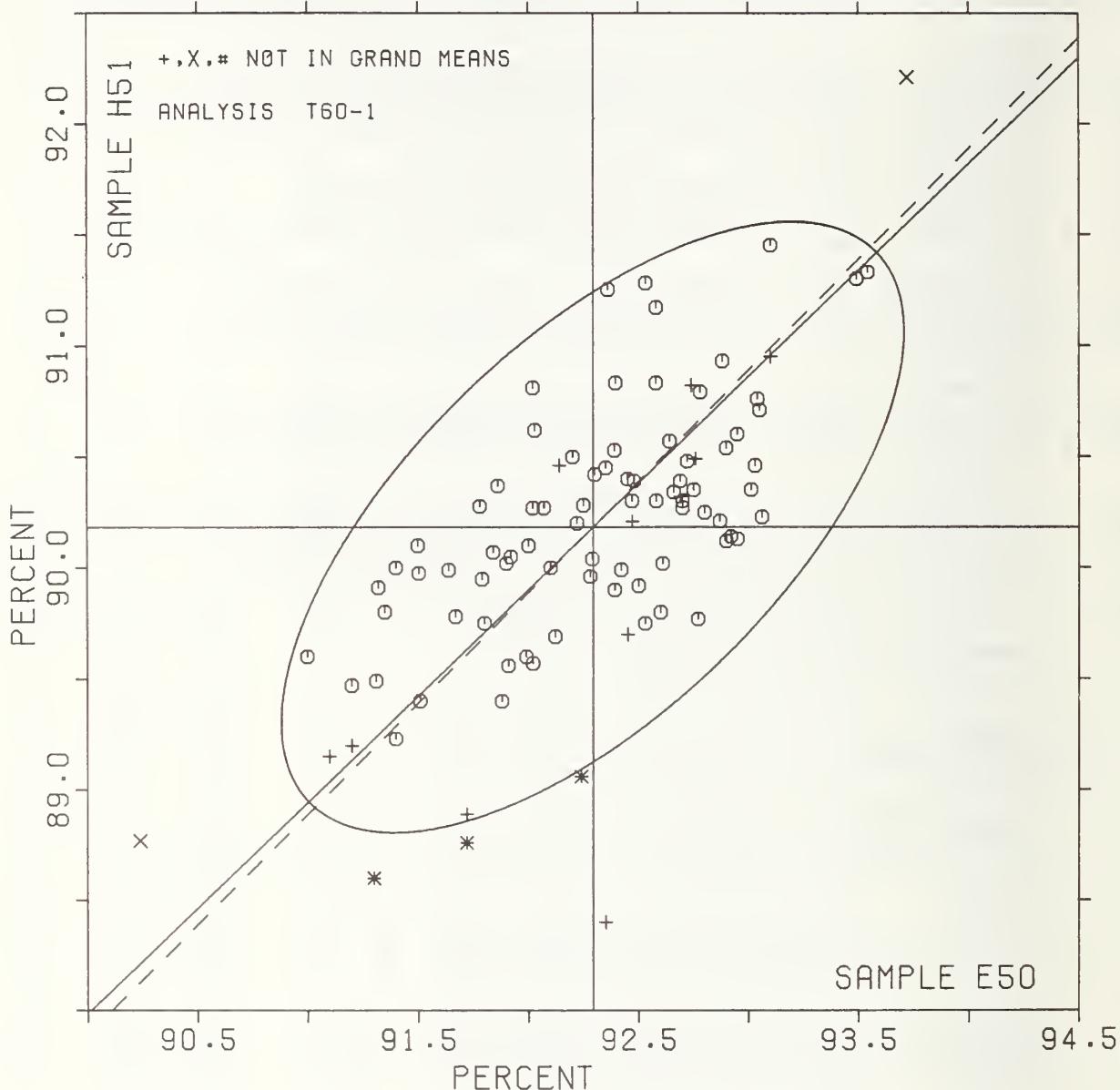
TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) = B&L TYPE

LAB CODE	F	MEANS E50	COORDINATES H51	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L210D	Ø	92.61	90.02	.12	-.34	.95	60D	OPACITY (WHITE BACKING), DIANG/BNL
L259	Ø	92.64	90.57	.52	.04	.78	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L275	Ø	92.66	90.34	.37	-.14	.48	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L236E	+	92.69	90.32	.38	-.18	.82	60E	OPACITY (WHITE BACKING), ZEISS ELREPHO, PMY-C(10) FILTER
L152	Ø	92.69	90.39	.43	-.12	.90	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L233B	Ø	92.70	90.30	.37	-.20	1.19	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L210B	Ø	92.70	90.27	.35	-.22	.94	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L172	Ø	92.72	90.48	.51	-.08	.82	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L314	+	92.74	90.82	.76	.15	.98	60T	OPACITY (WHITE BACKING), SMALL SPHERE COLOR EYE
L150	Ø	92.75	90.35	.45	-.20	1.01	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L249	+	92.76	90.49	.55	-.10	.83	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L228	Ø	92.77	89.77	.06	-.63	.98	60H	OPACITY (WHITE BACKING), HUYGEN
L288	Ø	92.78	90.79	.77	.10	.95	60D	OPACITY (WHITE BACKING), DIANG/BNL
L159	Ø	92.80	90.25	.41	-.30	.53	60R	OPACITY (WHITE BACKING), THWING-ALBERT (FORMERLY SRL)
L223B	Ø	92.87	90.21	.43	-.38	.52	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L162	Ø	92.88	90.93	.94	.13	.65	60W	OPACITY (WHITE BACKING), HUYGEN, DIGITAL
L190C	Ø	92.90	90.12	.39	-.47	.82	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L230	Ø	92.90	90.54	.68	-.16	.81	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L190R	Ø	92.92	90.14	.42	-.46	.85	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L136	Ø	92.95	90.13	.44	-.49	.78	60H	OPACITY (WHITE BACKING), HUYGEN
L157	Ø	92.95	90.60	.76	-.15	1.18	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L315	Ø	93.01	90.35	.63	-.38	.83	60D	OPACITY (WHITE BACKING), DIANG/BNL
L226B	Ø	93.03	90.46	.72	-.31	1.19	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L241	Ø	93.04	90.76	.94	-.10	1.27	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L115	Ø	93.05	90.71	.91	-.14	.80	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L158	Ø	93.06	90.23	.59	-.50	1.16	60D	OPACITY (WHITE BACKING), DIANG/BNL
L225	Ø	93.10	91.45	1.46	.36	1.46	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L224	+	93.10	90.95	1.11	-.00	1.02	60P	OPACITY (WHITE BACKING), PHOTOVOLT
L261	Ø	93.49	91.30	1.64	-.02	1.01	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L134	Ø	93.54	91.33	1.69	-.03	.60	60B	OPACITY (WHITE BACKING), BAUSCH + LÖMB
L608	X	93.72	92.21	2.43	.48	.87	60D	OPACITY (WHITE BACKING), DIANG/BNL
GMEANS:		92.29	90.18			1.00		
95% ELLIPSE:				1.78	.84			WITH GAMMA = 43 DEGREES

OPACITY, B&L TYPE, 89% BACKING

SAMPLE E50 = 92.3 PERCENT

SAMPLE H51 = 90.2 PERCENT



ANALYSIS T60-2 TABLE 1
 OPACITY (PAPER BACKING) IN PERCENT

TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE E50 GRAM SET PRINTING					SAMPLE H51 GRAM SET PRINTING					TEST D. = 10		
	MEAN	DEV	N. DEV	SDR	R. SDR	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L115	92.89	.42	.71	.33	.66	92.14	.23	.58	.23	.60	60C	G	L115
L118	92.44	.87	-1.46	.73	1.44	91.75	.16	.39	.25	.66	60C	G	L118
L182B	94.19	.88	1.48	.31	.61	92.84	.93	2.31	.66	1.75	60C	G	L182B
L190C	93.73	.42	.70	.32	.64	91.56	.35	.86	.31	.82	60C	G	L190C
L190R	93.67	.36	.60	.45	.90	91.88	.03	.07	.30	.81	60C	G	L190R
L236B	93.81	.50	.84	.70	1.40	91.74	.17	.41	.64	1.69	60C	G	L236B
L243	93.46	.15	.25	.49	.97	91.89	.02	.04	.26	.68	60C	G	L243
L502D	93.49	.18	.31	.45	.89	92.15	.25	.61	.46	1.21	60V	G	L502D
L502H	92.98	.33	-1.46	.56	1.11	91.73	.17	.43	.32	.84	60C	G	L502H
L543	92.44	.87	.71	.69	1.38	91.38	.53	-1.31	.35	.93	60V	G	L543

GR. MEAN = 93.31 PERCENT

SD MEANS = .59 PERCENT

GRAND MEAN = 91.91 PERCENT

SD OF MEANS = .40 PERCENT

TEST DETERMINATIONS = 10

10 LABS IN GRAND MEANS

AVERAGE SDR = .50 PERCENT

AVERAGE SDR =

.38 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 10

Best Values: E50 93.3 percent

H51 91.8 percent

E50 93.3 percent

H51 91.8 percent

ANALYSIS T60-2 TABLE 2
 OPACITY (PAPER BACKING) IN PERCENT

TAPPI STANDARD T425 GS-75, OPACITY OF PAPER (15 DEG./DIFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG R. SDR	VAR	PROPERTY --- TEST INSTRUMENT --- CONDITIONS			
		E50	H51	MAJOR	MINOR						
L118	G	92.44	91.75	-.85	.26	1.05	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L543	G	92.44	91.38	-1.02	-.07	1.15	60V	OPACITY (PAPER BACKING), DIANG/BNL			
L115	G	92.89	92.14	-.27	.40	.63	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L502H	G	92.98	91.73	-.37	-.01	.98	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L243	G	93.46	91.89	.13	-.08	.82	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L502D	G	93.49	92.15	.28	.14	1.05	60V	OPACITY (PAPER BACKING), DIANG/BNL			
L190R	G	93.67	91.88	.31	-.19	.85	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L190C	G	93.73	91.56	.22	-.50	.73	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L236B	G	93.81	91.74	.37	-.38	1.55	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			
L182B	G	94.19	92.84	1.21	.43	1.18	60C	OPACITY (PAPER BACKING), BAUSCH + LOMB			

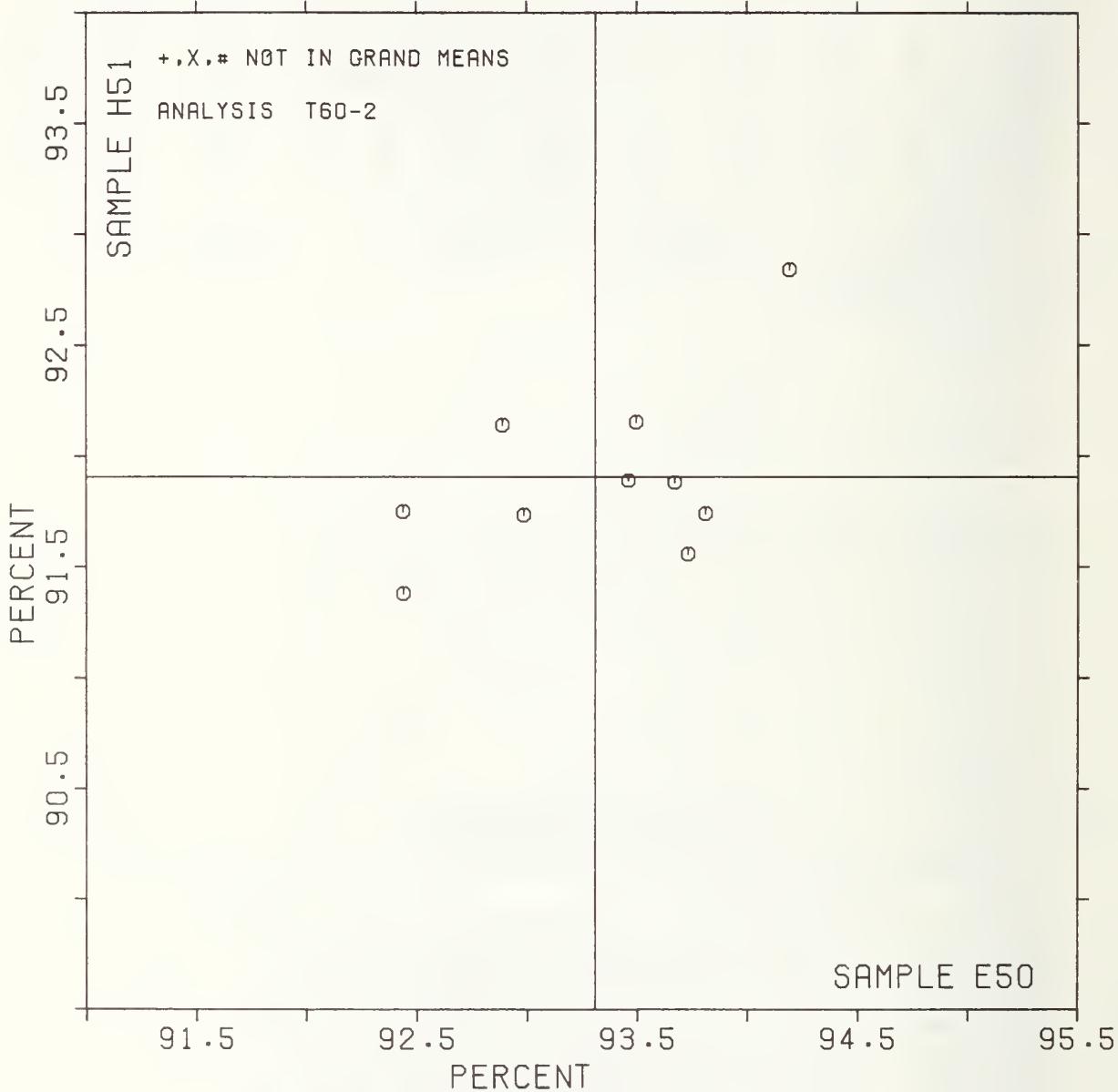
GMEANS: 93.31 91.91

95% ELLIPSE: 2.05 .98 WITH GAMMA = 26 DEGREES

OPACITY, B&L TYPE, PAPER BACKING

SAMPLE E50 = 93.3 PERCENT

SAMPLE H51 = 91.9 PERCENT



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T60-3 TABLE 1
OPACITY (PAPER BACKING) IN PERCENT

MARCH 1978

TAPPI SUGGESTED METHOD T519 SU-70, DIFFUSE OPACITY OF PAPER = ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE E50 MEAN					SAMPLE H51 MEAN					PRINTING					TEST D. ^a		
	OPFSET PRINTING		96 GRAMS PER SQUARE METER			PRINTING		91 GRAMS PER SQUARE METER			TEST D.							
	DEV	N.DEV	SDR	R.SDR		DEV	N.DEV	SDR	R.SDR		VAR	F	LAB					
L100	93.59	.40	-1.40	.36	1.27	92.84	.00	-.00	.27	1.16	60J	Ø	L100					
L150	94.16	.17	.57	.30	1.03	92.42	.42	-1.56	.21	.92	60J	Ø	L150					
L182E	94.29	.30	1.02	.21	.73	92.60	.24	-.89	.16	.71	60J	Ø	L182E					
L233F	94.26	.27	.92	.22	.78	92.81	.03	-.11	.30	1.30	60F	Ø	L233F					
L242	94.20	.21	.71	.09	.33	93.20	.36	1.33	.19	.84	60J	Ø	L242					
L244	94.39	.40	1.37	.35	1.22	93.17	.33	1.21	.14	.61	60F	Ø	L244					
L250T	94.19	.20	.68	.24	.83	92.88	.04	.15	.24	1.06	60J	Ø	L250T					
L251	92.93	-1.06	-3.68	.35	1.24	91.04	-1.80	-6.64	.29	1.26	60F	#	L251					
L360	93.84	-.15	-.54	.26	.91	92.77	-.07	-.26	.43	1.88	60F	Ø	L360					
L446	93.58	-.41	-1.42	.29	1.00	92.60	-.24	-.90	.30	1.30	60J	Ø	L446					
L484	93.85	-.14	-.49	.37	1.30	93.29	.45	1.64	.22	.96	60F	Ø	L484					
L502	93.92	-.08	-.27	.35	1.22	92.59	-.25	-.92	.10	.45	60J	Ø	L502					
L575	93.66	-.33	-1.16	.39	1.38	92.93	.09	.31	.19	.82	60J	Ø	L575					
GR. MEAN	93.99	PERCENT				GRAND MEAN	92.84	PERCENT						TEST DETERMINATIONS	=	10		
SD MEANS	.29	PERCENT				SD OF MEANS	.27	PERCENT						12 LABS IN GRAND MEANS				
	AVERAGE SDR	.	.29	PERCENT		AVERAGE SDR	.	.23	PERCENT									
L176	78.52	-15.47	-53.62	.13	.46	75.33	-17.51	-64.59	.07	.29	60Z	♦	L176					
L564	93.10	-.89	-3.10	.88	3.07	89.60	-3.24	-11.95	.52	2.23	60Q	♦	L564					
TOTAL NUMBER OF LABORATORIES REPORTING			15															
Best Values:	E50	94.0	+	0.4	percent	H51	92.8	+	0.4	percent								

The following laboratories were omitted from the grand means because of extreme test results: 251.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T60-3 TABLE 2
OPACITY (PAPER BACKING) IN PERCENT

MARCH 1978

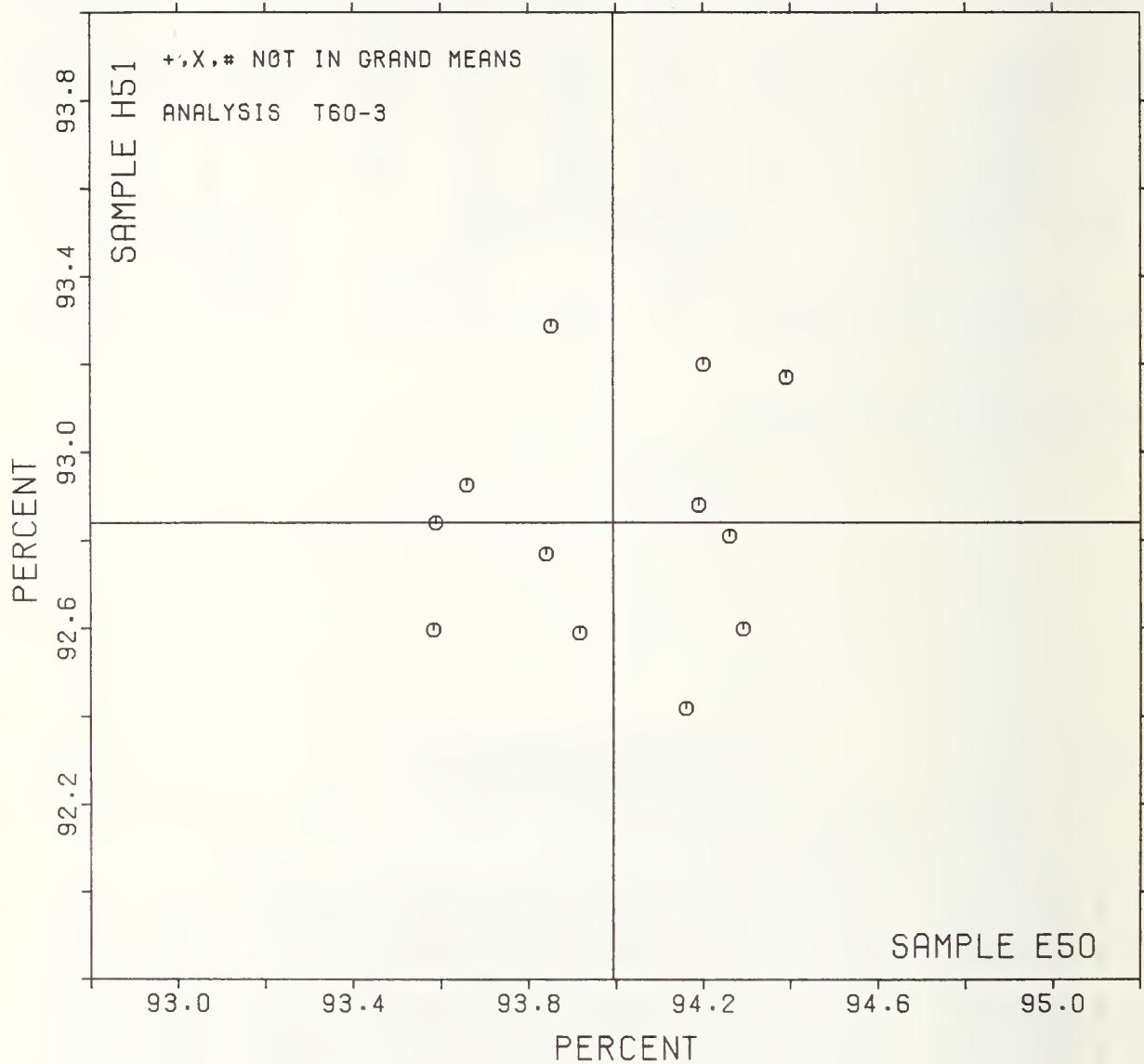
TAPPI SUGGESTED METHOD T519 SU-70, DIFFUSE OPACITY OF PAPER = ILLUMINANT C, ELREPHO TYPE

LAB CODE	MEANS		COORDINATES		AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
	F	E50	H51	MAJOR	MINOR				
L176	♦	78.52	75.33	-22.28	-7.03	.38	60Z	OPACITY (PAPER BACKING), MARTIN SWEETS	
L251	#	92.93	91.04	-1.84	-1.00	1.25	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) NO TRAP	
L564	♦	93.10	89.60	-2.44	-2.32	2.65	60Q	OPACITY (PAPER BACKING), PHOTOGVLT	
L446	Ø	93.58	92.60	-.48	.00	1.15	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L100	Ø	93.59	92.84	-.35	.21	1.22	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L575	Ø	93.66	92.93	-.24	.25	1.10	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L360	Ø	93.84	92.77	-.17	.02	1.39	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) NO TRAP	
L484	Ø	93.85	93.29	.11	.46	1.13	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) NO TRAP	
L502	Ø	93.92	92.59	-.20	-.17	.84	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L150	Ø	94.16	92.42	-.08	-.45	.98	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L250T	Ø	94.19	92.88	.19	-.07	.94	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L242	Ø	94.20	93.20	.36	.20	.59	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L233F	Ø	94.26	92.81	.21	-.16	1.04	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) NO TRAP	
L182E	Ø	94.29	92.60	.13	-.36	.72	60J	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) FILTER	
L244	Ø	94.39	93.17	.51	.08	.92	60F	OPACITY (PAPER BACKING), ZEISS ELREPHO, PMY-C(10) NO TRAP	
GMEANS:		93.99	92.84			1.00			
95% ELLIPSE:		.90	.78			WITH GAMMA = 31 DEGREES			

OPACITY, ELREPHO TYPE, PAPER BACKING

SAMPLE E50 = 93.99 PERCENT

SAMPLE H51 = 92.84 PERCENT



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T65-1 TABLE 1
DIRECTIONAL BLUE REFLECTANCE IN PERCENT

MARCH 1978

TAPPI STANDARD T452 OS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE H31	PRINTING 84 GRAMS PER SQUARE METER				SAMPLE H53	PRINTING 74 GRAMS PER SQUARE METER				TEST D. = 8		
		MEAN	DEV	N.DEV	SDR		MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F
L108	80.99	.08	.29	.04	.21	68.35	.06	.26	.18	.78	65N	0	L108
L122	81.06	.00	.00	.09	.54	68.05	.24	-1.05	.33	1.42	65N	0	L122
L132	80.64	.43	-1.62	.12	.70	67.92	.37	-1.60	.17	.73	65N	0	L132
L158	81.21	.15	.56	.16	.92	68.44	.15	.64	.18	.81	65N	0	L158
L172	81.05	.01	-.05	.19	1.10	68.19	.10	-.45	.19	.82	65A	0	L172
L190C	81.31	.25	.94	.10	.59	68.21	-.08	-.34	.16	.68	65A	0	L190C
L210M	81.40	.34	1.28	.09	.55	68.50	.21	.92	.25	1.10	65M	0	L210M
L210N	81.22	.16	.61	.21	1.22	68.52	.23	1.03	.17	.73	65N	0	L210N
L211	80.34	.73	-2.76	.11	.63	68.52	.23	1.03	.12	.51	65N	#	L211
L225	80.95	-.11	-.43	.67	3.94	68.62	.33	1.46	.18	.77	65N	0	L225
L243	80.87	-.19	-.72	.07	.42	68.11	-.18	-.78	.20	.86	65A	0	L243
L259	80.62	-.44	-1.67	.15	.88	68.06	-.23	-1.00	.37	1.62	65M	0	L259
L275	80.97	-.09	-.34	.12	.69	68.26	-.03	-.12	.16	.70	65M	0	L275
L288	81.49	.42	1.61	.10	.59	68.22	-.07	-.29	.23	.99	65N	0	L288
L308	81.37	.31	1.18	.17	.99	68.69	.40	1.74	.14	.59	65N	0	L308
L315	80.81	-.25	-.95	.21	1.24	67.95	-.34	-1.49	.28	1.24	65N	0	L315
L317	80.60	-.46	-1.76	.09	.55	68.05	-.24	-1.05	.12	.52	65M	0	L317
L502	81.02	-.04	-.15	.22	1.30	68.25	-.04	-.18	.22	.98	65A	0	L502
L523	81.35	.29	1.09	.12	.71	68.32	.03	.15	.50	2.19	65N	0	L523
L543	81.20	.14	.52	.36	2.13	68.50	.21	.92	.37	1.62	65M	0	L543
L565	81.11	.05	.19	.12	.74	68.57	.28	1.24	.20	.87	65A	0	L565
L598	82.09	1.02	3.89	.54	3.21	68.65	.36	1.57	.59	2.57	65M	#	L598
GR. MEAN = 81.06 PERCENT						GRAND MEAN = 68.29 PERCENT					TEST DETERMINATIONS = 8		
SD MEANS = .26 PERCENT						SD OF MEANS = .23 PERCENT					20 LABS IN GRAND MEANS		
AVERAGE SDR = .17 PERCENT						AVERAGE SDR = .23 PERCENT							
L105	81.36	.30	1.13	.05	.31	67.64	-.65	-2.86	.18	.77	65T	0	L105
L176I	82.04	.97	3.70	.15	.89	68.09	-.20	-.89	.21	.92	65I	0	L176I
L213	81.39	.32	1.23	.04	.21	67.96	-.33	-1.44	.14	.62	65T	0	L213
L223	81.25	.19	.71	.05	.32	67.94	-.35	-1.55	.09	.40	65G	0	L223
L224	82.52	1.46	5.55	.09	.53	68.62	.33	1.46	.13	.56	65H	0	L224
L232	81.94	.87	3.32	.18	1.05	68.87	.58	2.56	.23	1.01	65P	0	L232
L241	82.39	1.32	5.02	1.03	6.11	71.07	2.78	12.19	.15	.65	65I	0	L241
L249	81.02	-.04	-.15	.05	.27	68.96	.67	2.94	.09	.40	65P	0	L249
L256	81.25	.20	.75	.09	.54	67.69	-.60	-2.64	.33	1.45	65H	0	L256
L260	81.40	.34	1.28	.13	.78	70.05	1.76	7.70	.20	.87	65P	0	L260
L277	80.00	-1.06	-4.04	.00	.00	68.00	-.29	-1.27	.00	.00	65P	0	L277
L278	84.30	3.24	12.28	.19	1.10	71.85	3.56	15.58	.17	.74	65P	0	L278
L301	80.99	-.08	-.29	.08	.49	68.39	.10	.42	.20	.89	65G	0	L301
L312	81.56	.50	1.89	.32	1.90	70.56	2.27	9.94	.42	1.83	65P	0	L312
L321	84.31	3.25	12.33	.37	2.20	80.50	12.21	53.44	.38	1.65	65P	0	L321
L328	81.86	.80	3.03	.13	.77	69.64	1.35	5.90	.31	1.34	65P	0	L328
L339	79.89	-1.18	-4.46	.17	1.02	69.59	1.30	5.68	.31	1.37	65P	0	L339
L388	80.62	-.44	-1.67	.23	1.37	68.19	-.10	-.45	.26	1.13	65P	0	L388
L562	84.47	3.41	12.95	.38	2.28	73.36	5.07	22.20	.23	1.02	65P	0	L562
L564	80.62	-.44	-1.67	.52	3.07	69.00	.71	3.10	.00	.00	65P	0	L564
L587	81.26	.20	.75	.05	.31	67.70	-.59	-2.59	.14	.62	65I	0	L587
L591	80.26	-.81	-3.06	.07	.43	66.94	-1.35	-5.90	.11	.47	65H	0	L591
L617	82.44	1.37	5.21	.32	1.90	69.56	1.27	5.57	.73	3.19	65P	0	L617
TOTAL NUMBER OF LABORATORIES REPORTING = 45													
Best Values: H31 81.1 + 0.4 percent													
H53 68.3 + 0.3 percent													

The following laboratories were omitted from the grand means because of extreme test results: 211, 598.

ANALYSIS T65-1 TABLE 2

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

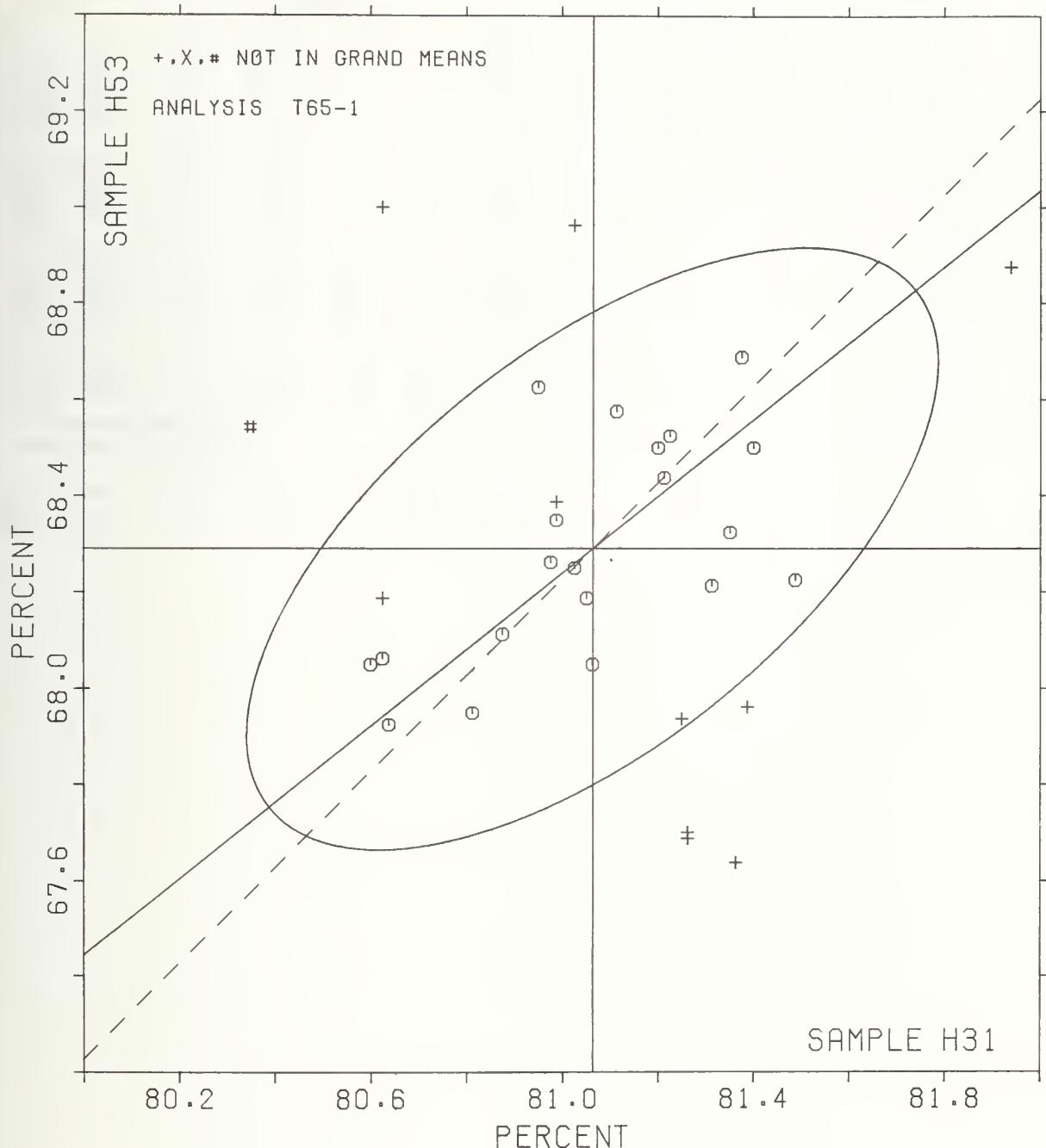
TAPPI STANDARD T452 GS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACET & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	H31	H53	COORDINATES MAJOR	MINOR	R. SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	♦	79.89	69.59	.11	1.75	1.20 65F BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L277	♦	80.00	68.00	-1.01	.43	.00 65P BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L591	♦	80.26	66.94	-1.47	.55	.45 65H BLUE	REFLECTANCE (DIRECTIONAL), HUNTER
L211	#	80.34	68.52	.42	.64	.57 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L317	G	80.60	68.05	-.51	.10	.54 65W BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L388	♦	80.62	68.19	-.41	.19	1.25 65F BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L259	G	80.62	68.06	-.49	.09	1.25 65M BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L564	♦	80.62	69.00	.10	.83	1.53 65F BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L132	G	80.64	67.92	-.56	.02	.72 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L315	G	80.81	67.95	-.41	-.11	1.24 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L243	G	80.87	68.11	-.26	-.02	.64 65A BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACET), S-2
L225	G	80.95	68.62	.12	.33	2.36 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L275	G	80.97	68.26	-.09	.03	.69 65M BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L108	G	80.99	68.35	-.02	.09	.49 65M BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L301	♦	80.99	68.39	.00	.12	.69 65G BLUE	REFLECTANCE (DIRECTIONAL), GARDNER
L249	♦	81.02	68.96	.39	.55	.34 65F BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L502	G	81.02	68.25	-.06	-.01	1.14 65A BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACET), S-2
L172	G	81.05	68.19	-.07	-.07	.96 65A BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACET), S-2
L122	G	81.06	68.05	-.15	.19	.98 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L565	G	81.11	68.57	.22	.19	.80 65A BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L543	G	81.20	68.50	.24	.08	1.87 65M BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L158	G	81.21	68.44	.21	.02	.86 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L210N	G	81.22	68.52	.27	.08	.97 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L223	♦	81.25	67.94	-.07	-.39	.36 65G BLUE	REFLECTANCE (DIRECTIONAL), GARDNER
L587	♦	81.26	67.70	-.21	-.59	.46 65I BLUE	REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L256	♦	81.26	67.69	-.22	-.60	1.00 65H BLUE	REFLECTANCE (DIRECTIONAL), HUNTER
L190C	G	81.31	68.21	.15	.22	.63 65A BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACET), S-2
L523	G	81.35	68.32	.25	-.15	1.45 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L105	♦	81.36	67.64	-.17	-.70	.54 65T BLUE	REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L308	G	81.37	68.69	.49	.12	.79 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L213	♦	81.39	67.96	.05	-.46	.41 65T BLUE	REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L210M	G	81.40	68.50	.39	-.05	.82 65W BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L260	♦	81.40	70.05	1.36	1.17	.83 65P BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L288	G	81.49	68.22	.29	-.32	.79 65N BLUE	REFLECTANCE (DIRECTIONAL), DIANG/MARTIN SWEETS, S-4
L312	♦	81.56	70.56	1.80	1.47	1.86 65P BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L328	♦	81.86	69.64	1.46	.56	1.06 65P BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L232	♦	81.94	68.87	1.05	-.09	1.03 65P BLUE	REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L176I	G	82.04	68.09	.64	-.77	.91 65I BLUE	REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L598	#	82.09	68.65	1.02	-.36	2.89 65W BLUE	REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L241	♦	82.39	71.07	2.77	1.35	3.38 65I BLUE	REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
GMEANS:		81.06	68.29			1.00	
		95% ELLIPSE:		.86	.41	WITH GAMMA = 38 DEGREES	

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE H31 = 81.06 PERCENT

SAMPLE H53 = 68.29 PERCENT



ANALYSIS T65-2 TABLE 1

DIPPUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)

TAPPI SUGGESTED METHOD TS25 SU-72, BRIGHTNESS OF PULP (DIPPUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE H31	PRINTING					SAMPLE H53	PRINTING					TEST D.*		
		MBAN	DEV	N. DEV	SDR	R. SDR		MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	81.68	-.03	-.04	.06	1.02	67.76	-.16	-.18	.18	.87	65P	G	L100		
L121	81.74	.04	.05	.05	.81	67.99	.07	.08	.21	1.04	65K	G	L121		
L136	82.18	.48	.59	.10	1.57	68.24	.32	.35	.18	.88	65F	G	L136		
L150	80.66	-1.05	-1.29	.05	.79	65.89	-2.03	-2.21	.49	2.42	65Q	G	L150		
L170	81.37	-.33	-.41	.05	.73	67.89	-.04	-.04	.10	.49	65B	G	L170		
L182	81.61	-.09	-.11	.05	.74	67.80	-.12	-.13	.24	1.16	65P	G	L182		
L210K	82.65	.95	1.17	.06	.93	69.81	1.89	2.05	.23	1.14	65K	G	L210K		
L236	81.31	-.40	-.49	.05	.73	67.33	-.59	-.64	.16	.79	65K	G	L236		
L242	81.18	-.52	-.64	.09	1.47	67.27	-.65	-.71	.18	.88	65P	G	L242		
L250T	81.66	-.04	-.05	.05	.74	68.34	.42	.46	.16	.80	65P	G	L250T		
L280	81.64	-.07	-.08	.15	2.32	68.12	.19	.21	.29	1.40	65Q	G	L280		
L325	81.82	.11	.14	.09	1.41	67.93	.00	.00	.15	.72	65F	G	L325		
L349	83.93	2.23	2.75	.05	.84	69.56	1.63	1.77	.19	.93	65K	*	L349		
L362	80.56	-1.15	-1.42	.05	.73	67.09	-.83	-.90	.15	.73	65K	G	L362		
L446	81.39	-.32	-.39	.02	.28	67.64	-.29	-.31	.18	.89	65P	G	L446		
L502A	80.77	-.93	-1.15	.09	1.34	66.92	-1.00	-1.09	.26	1.30	65B	G	L502A		
L573	82.76	1.06	1.30	.05	.82	68.98	1.05	1.14	.15	.74	65P	G	L573		
L575	81.78	.07	.09	.04	.56	68.07	.15	.16	.16	.76	65F	G	L575		
GR. MEAN = 81.71 PERCENT		GRAND MEAN = 67.92 PERCENT					TEST DETERMINATIONS = 8								
SD MEANS = .81 PERCENT		SD OF MEANS = .92 PERCENT					18 LABS IN GRAND MEANS								
AVERAGE SDR = .06 PERCENT		AVERAGE SDR = .20 PERCENT													
L289	82.70	.99	1.23	.05	.84	68.82	.90	.98	.13	.63	65G	*	L289		
L502B	81.53	-.17	-.21	.04	.64	67.68	-.25	-.27	.35	1.72	65L	*	L502B		
L502C	81.20	-.50	-.62	.01	.17	67.06	-.87	-.94	.21	1.05	65Y	*	L502C		
TOTAL NUMBER OF LABORATORIES REPORTING = 21															

Best Values: H31 81.5 + 1.1 percent
H53 67.9 + 1.7 percent

ANALYSIS T65-2 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAF)

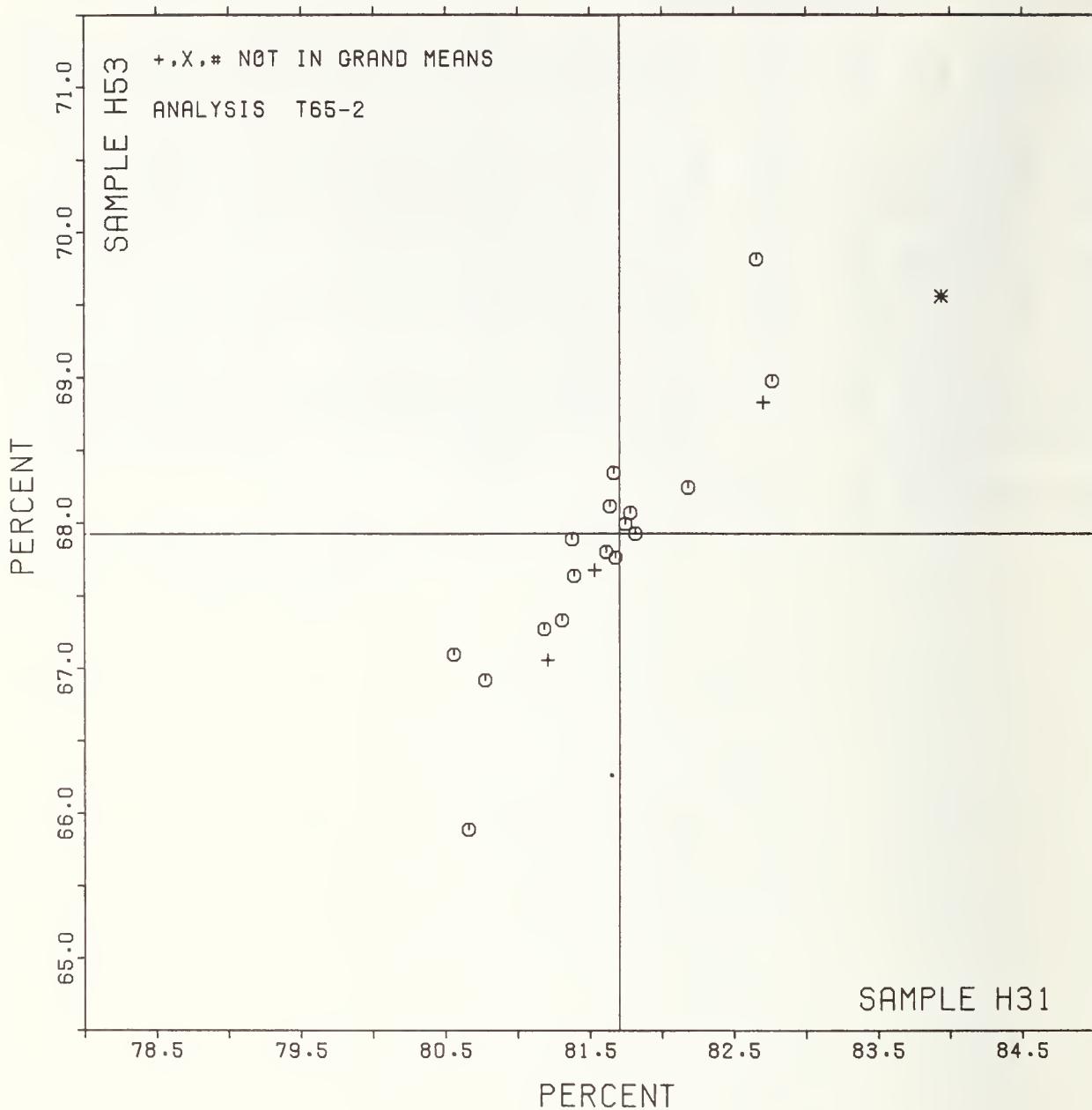
TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS H31	MEANS H53	COORDINATES MAJOR	COORDINATES MINOR	Avg R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L362	0	80.56	67.09	-1.38	.32	.73	65K DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, MGG (ZEISS) BASE
L150	0	80.66	65.89	-2.22	-.54	1.61	65Q DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, ZEISS ABSOLUTE BASE
L502A	0	80.77	66.92	-1.37	.05	1.32	65B DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NBS ABSOLUTE BASE
L242	0	81.18	67.27	-.84	-.03	1.17	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L502C	*	81.20	67.06	-.98	-.19	.61	65Y DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NBS ABSOLUTE, PWZC
L236	0	81.31	67.33	-.71	-.09	.76	65K DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, MGG (ZEISS) BASE
L170	0	81.37	67.89	-.24	.23	.61	65B DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NBS ABSOLUTE BASE
L445	0	81.39	67.64	-.42	.05	.58	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L502B	*	81.53	67.68	-.30	-.03	1.18	65L DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NBS ABSOLUTE, FNZA
L182	0	81.61	67.80	-.15	-.01	.95	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-PTB ABSOLUTE BASE
L280	0	81.64	68.12	.10	.18	1.86	65Q DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, ZEISS ABSOLUTE BASE
L250T	0	81.66	68.34	.29	.31	.77	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L100	0	81.68	67.76	-.14	-.08	.94	65P DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L121	0	81.74	67.99	.08	.02	.93	65K DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, MGG (ZEISS) BASE
L575	0	81.78	68.07	.16	.04	.66	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L325	0	81.82	67.93	.07	-.08	1.07	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L136	0	82.18	68.24	.55	-.15	1.23	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L210K	0	82.65	69.81	2.05	.52	1.04	65K DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, MGG (ZEISS) BASE
L289	*	82.70	68.82	1.33	-.16	.73	65G DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, SPECIFIC CALIBRATION
L573	0	82.76	68.98	1.49	-.11	.78	65F DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, NRC-FTB ABSOLUTE BASE
L349	*	83.93	69.56	2.69	-.61	.88	65K DIFFUSE REFLECTANCE, ELREFHG, GL.TRAF, MGG (ZEISS) BASE
GMEANS:		81.71	67.92			1.00	
95% ELLIPSE:		81.32	67.66				WITH GAMMA = 49 DEGREES

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE H31 = 81.7 PERCENT

SAMPLE H53 = 67.9 PERCENT



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T65-3 TABLE 1

MARCH 1978

TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE	PRINTING					SAMPLE	PRINTING					TEST D.	S		
	H31	84 GRAMS PER SQUARE METER	MEAN	DEV	N. DEV	SDR	R. SDR	H53	74 GRAMS PER SQUARE METER	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F
L115	80.40	-1.20	-2.03	.12	1.70	67.61	-1.28	-1.90	.18	.95	65E	Ø L115				
L152	81.55	-.04	-.07	.08	1.08	68.63	-.26	-.38	.19	1.01	65E	Ø L152				
L157	81.52	-.08	-.14	.05	.74	68.83	-.06	-.09	.14	.74	65E	Ø L157				
L161	81.69	.09	.16	.08	1.13	69.35	.47	.69	.15	.78	65E	Ø L161				
L173A	82.00	.40	.68	.09	1.32	69.32	.43	.64	.22	1.14	65E	Ø L173A				
L194	81.54	-.06	-.10	.04	.50	68.87	-.02	-.03	.22	1.14	65E	Ø L194				
L238A	81.90	.30	.51	.08	1.08	69.20	.32	.47	.15	.76	65E	Ø L238A				
L244	82.42	.83	1.39	.04	.52	69.15	.26	.39	.20	1.07	65D	Ø L244				
L251	81.21	-.39	-.66	.09	1.32	68.46	-.43	-.64	.09	.45	65E	Ø L251				
L255	82.67	1.07	1.80	.05	.68	69.48	.59	.88	.23	1.19	65D	Ø L255				
L350	81.09	-.51	-.85	.05	.74	68.23	-.66	-.98	.14	.74	65E	Ø L360				
L384	81.34	-.26	-.44	.05	.74	68.52	-.36	-.54	.09	.47	65S	Ø L384				
L484	82.30	.70	1.19	.16	2.29	70.51	1.62	2.41	.55	2.88	65E	Ø L484				
L502D	81.33	-.27	-.45	.05	.66	68.33	-.56	-.83	.18	.94	65W	Ø L502D				
L565	81.01	-.59	-.99	.04	.51	68.82	-.06	-.09	.14	.73	65W	Ø L565				
GR. MEAN = 81.60 PERCENT						GRAND MEAN = 68.89 PERCENT					TEST DETERMINATIONS = 8					
SD MEANS = .59 PERCENT						SD OF MEANS = .67 PERCENT					15 LABS IN GRAND MEANS					
AVERAGE SDR = .07 PERCENT						AVERAGE SDR = .19 PERCENT										
TOTAL NUMBER OF LABORATORIES REPORTING = 15																
Best Values: H31 81.5 ± 0.9 percent																
H53 68.7 ± 1.0 percent																

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T65-3 TABLE 2

MARCH 1978

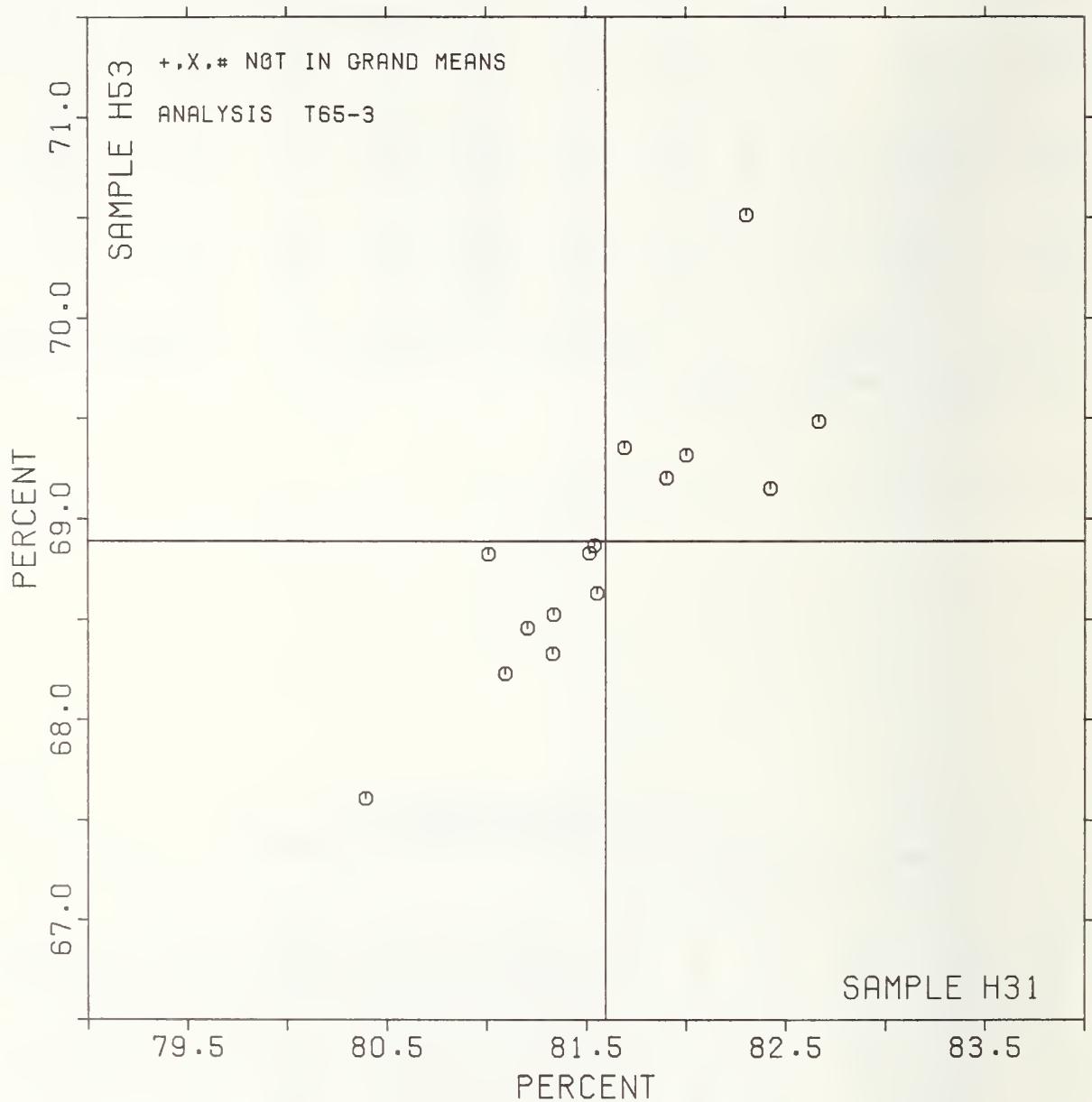
TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS	COORDINATES	Avg	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L115	Ø	80.40	67.61	-1.75	.08	1.32	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L565	Ø	81.01	68.82	-.43	.40	.62	65W DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, NBS MGØ BASE
L350	Ø	81.09	68.23	-.83	-.05	.74	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L251	Ø	81.21	68.46	-.58	.02	.90	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L502D	Ø	81.33	68.33	-.60	-.16	.80	65W DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, NBS MGØ BASE
L384	Ø	81.34	68.52	-.45	-.04	.60	65S DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, ABSOLUTE=UNKNOWN BASE
L157	Ø	81.52	68.83	-.10	.02	.74	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L194	Ø	81.54	68.87	-.05	.03	.82	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L152	Ø	81.55	68.63	-.22	-.13	1.04	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L161	Ø	81.69	69.35	.41	.23	.95	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L238A	Ø	81.90	69.20	.44	-.02	.92	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L173A	Ø	82.00	69.32	.59	-.03	1.23	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L484	Ø	82.30	70.51	1.69	.53	2.58	65E DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, MGØ (ZEISS) BASE
L244	Ø	82.42	69.15	.74	-.45	.79	65D DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, NRC=FTB ABSOLUTE
L255	Ø	82.67	69.48	1.15	-.42	.93	65D DIFFUSE REFLECTANCE, ELEREFHG, NG TRAP, NRC=FTB ABSOLUTE
GMEANS:		81.60	68.89		1.00		
95% ELLIPSE:		2.46	.74		WITH GAMMA = 49 DEGREES		

BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE H31 = 81.6 PERCENT

SAMPLE H53 = 68.9 PERCENT



LA8 CODE	SAMPLE J23	PRINTING				SAMPLE H55	PRINTING				TEST D. = 10		
		MEAN	DEV	N.DEV	SDR		MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F
L108	67.24	.63	.40	.64	.65	55.91	.28	.14	2.86	1.79	75H	6	L108
L121	66.97	.36	.23	.62	.62	54.36	-1.27	-.65	1.23	.77	75H	6	L121
L122	65.58	-.63	-.40	.62	.63	55.32	-.31	-.16	1.64	1.03	75H	6	L122
L128	63.90	-2.71	-1.72	1.52	1.54	52.80	-2.83	-1.44	1.69	1.06	75G	6	L128
L134	65.36	-1.25	-.79	.92	.93	53.01	-2.62	-1.33	1.97	1.23	75H	6	L134
L136	68.54	2.33	1.48	.66	.67	57.07	1.44	.73	1.80	1.13	75G	6	L136
L149	66.60	-.01	-.00	.84	.85	57.50	1.87	.95	1.90	1.19	75G	6	L149
L153	68.15	1.54	.98	1.49	1.51	59.25	3.62	1.84	1.38	.86	75G	6	L153
L162	70.59	3.98	2.53	.36	.36	61.77	6.14	3.12	1.31	.82	75G	#	L162
L166	68.00	1.39	.89	.82	.83	60.30	4.67	2.37	.82	.52	75H	#	L166
L172	63.92	-2.69	-1.71	.62	.63	51.58	-4.05	-2.06	1.19	.75	75H	6	L172
L173A	66.69	.08	.05	.82	.83	55.60	-.03	-.02	1.41	.88	75G	6	L173A
L182	66.36	-.25	-.16	1.30	1.31	56.17	.54	.27	1.12	.70	75H	6	L182
L190C	66.50	-.11	-.07	.71	.72	55.00	-.63	-.32	1.56	.98	75G	6	L190C
L190R	65.62	-.99	-.63	.61	.61	57.41	1.78	.90	1.82	1.14	75G	6	L190R
L206	65.95	-.66	-.42	1.14	1.15	55.04	-.59	-.30	1.51	.95	75H	6	L206
L210	70.32	3.71	2.36	.99	1.00	57.63	2.00	1.02	1.67	1.05	75H	#	L210
L211	67.33	.72	.46	.87	.88	56.40	.77	.39	1.69	1.06	75H	6	L211
L213	67.08	.47	.30	1.14	1.16	55.17	-.46	-.23	2.47	1.55	75H	6	L213
L223	67.25	.64	.41	.89	.90	55.98	.35	.18	1.82	1.14	75H	6	L223
L230	63.75	-2.86	-1.82	1.01	1.02	53.36	-2.27	-1.15	1.37	.86	75H	6	L230
L243	67.80	1.19	.76	.79	.80	56.10	.47	.24	2.33	1.46	75H	6	L243
L251	69.30	2.69	1.71	.82	.83	56.55	.92	.47	1.50	.94	75G	6	L251
L255	66.60	-.01	-.00	.84	.85	56.40	.77	.39	.97	.61	75H	6	L255
L256	66.80	.19	.12	1.10	1.12	55.14	-.49	-.25	1.47	.92	75H	6	L256
L259	67.53	.92	.59	1.08	1.09	57.35	1.72	.87	2.47	1.55	75H	6	L259
L262	67.80	1.19	.76	.79	.80	59.30	3.67	1.86	1.16	.73	75K	6	L262
L277A	66.59	-.02	-.01	1.08	1.09	55.66	.03	.01	1.45	.91	75H	6	L277A
L277B	66.78	.17	.11	1.35	1.37	56.36	.73	.37	1.43	.90	75H	6	L277B
L278	66.74	.13	.09	1.25	1.26	56.20	.57	.29	1.88	1.18	75Q	6	L278
L279	65.00	-1.61	-.02	1.63	1.65	54.40	-1.23	-.63	2.41	1.51	75G	6	L279
L291	63.93	-2.68	-1.70	1.03	1.04	52.36	-3.27	-1.66	2.02	1.27	75H	6	L291
L301	66.16	-.45	-.28	.88	.89	54.63	-1.00	-.51	.48	.30	75H	6	L301
L315	63.60	-3.01	-.91	1.17	1.19	54.90	-.73	-.37	1.52	.95	75G	6	L315
L317	67.71	1.10	.70	.80	.81	55.36	-.27	-.14	1.53	.96	75H	6	L317
L321	66.30	-.31	-.19	1.06	1.07	54.90	-.73	-.37	1.10	.69	75G	6	L321
L323	65.83	-.78	-.49	1.09	1.10	54.50	-1.13	-.58	1.71	1.07	75H	6	L323
L328	65.41	-1.20	-.76	.74	.75	60.57	4.94	2.51	2.49	1.56	75H	X	L328
L339	55.89	-10.72	-6.82	3.04	3.08	50.74	-4.89	-2.49	1.12	.70	75P	#	L339
L349	65.42	-1.19	-.75	1.11	1.12	61.55	5.92	3.01	1.68	1.05	75H	X	L349
L388	58.10	-8.51	-.51	1.63	1.65	48.80	-6.83	-3.47	.71	.45	75P	#	L388
L396	65.85	-.76	-.48	.67	.68	55.80	.17	.09	1.30	.81	75G	6	L396
L456	66.46	-.15	-.09	.50	.51	54.41	-1.22	-.62	1.14	.71	75H	6	L456
L483	65.04	-1.57	-.00	1.20	1.21	54.05	-1.58	-.80	1.30	.82	75H	6	L483
L502G	66.93	.32	.21	1.36	1.38	54.80	-.83	-.42	.93	.58	75G	6	L502G
L502H	67.68	1.08	.69	.77	.78	56.48	.85	.43	1.60	1.00	75H	6	L502H
L564	59.60	-7.01	-4.46	1.35	1.37	49.20	-6.43	-3.27	1.69	1.06	75P	X	L564
L573	64.00	-2.61	-.66	1.15	1.17	52.70	-2.93	-1.49	2.31	1.45	75G	6	L573
L574	66.60	-.01	-.00	.97	.98	54.50	-1.13	-.58	1.78	1.12	75G	6	L574
L583	65.68	-.93	-.59	1.24	1.26	55.91	.28	.14	.84	.53	75H	6	L583
L587	68.10	1.49	.95	1.10	1.11	55.20	-.43	-.22	.92	.58	75H	6	L587
L592	67.15	.54	.35	1.30	1.32	54.12	-1.51	-.77	2.23	1.40	75H	6	L592

GR. MEAN = 66.61 GLOSS UNITS

SD MEANS = 1.57 GLOSS UNITS

AVERAGE SDR = .99 GLOSS UNITS

GRAND MEAN = 55.63 GLOSS UNITS

SD OF MEANS = 1.97 GLOSS UNITS

AVERAGE SDR = 1.60 GLOSS UNITS

TEST DETERMINATIONS = 10

47 LABS IN GRAND MEANS

L250 65.50 -1.11 -.70 .82 .83 52.85 -2.78 -1.41 .58 .36 75Q * L250
L288 67.02 .41 .26 .68 .69 55.08 -.55 -.28 1.64 1.03 75I * L288

TOTAL NUMBER OF LABORATORIES REPORTING = 54

Best Values: J23 67 + 3 gloss units

H55 56 ± 3 gloss units

The following laboratories were omitted from the grand means because of extreme test results: 339, 388.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T75-1 TABLE 2
SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS

MARCH 1978

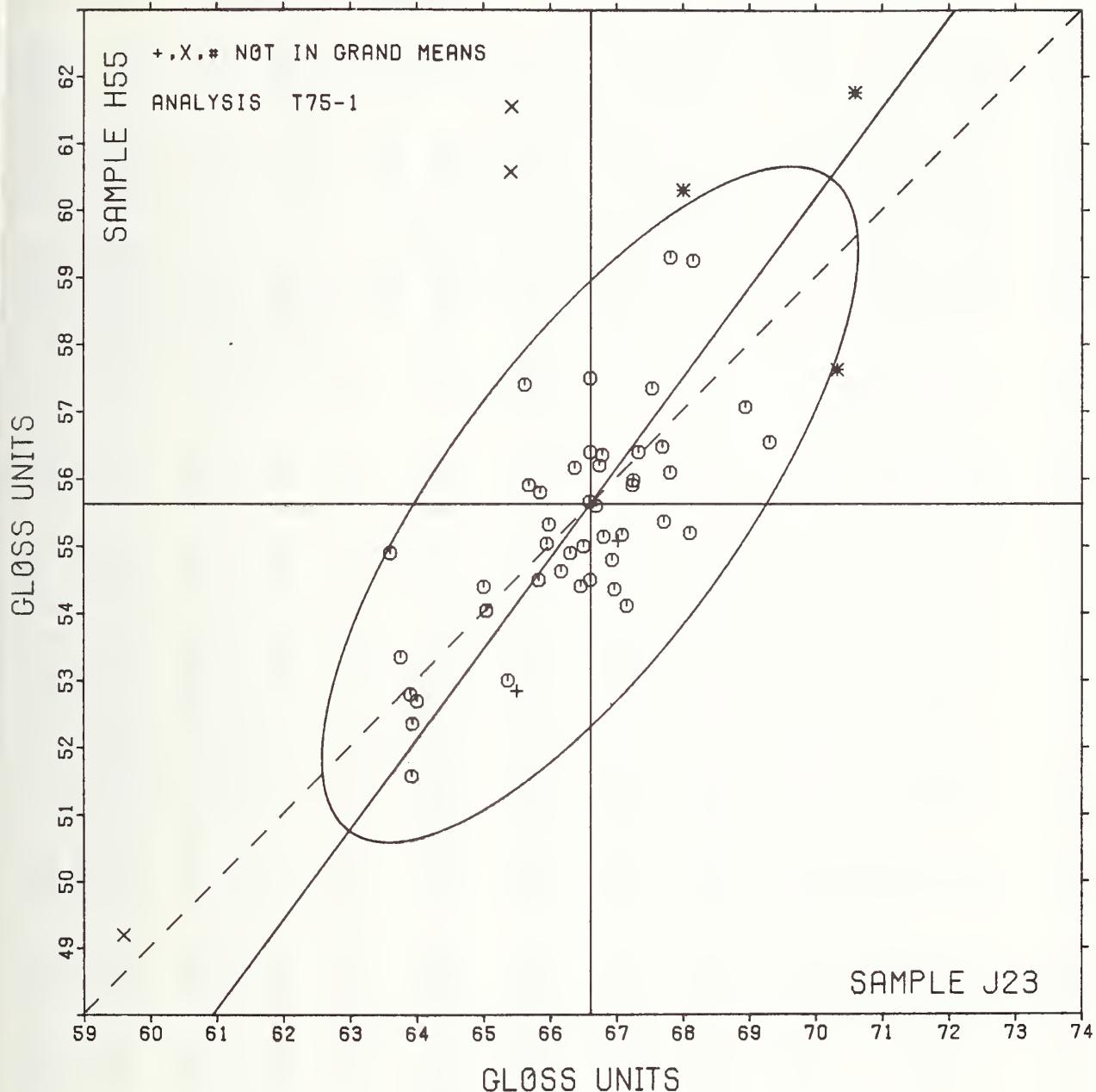
TAPPI STANDARD T480 GS-72, SPECULAR GLASS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CGDB	F	MEANS J23	MEANS H55	COORDINATES MAJOR	COORDINATES MINOR	Avg R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	#	55.89	50.74	-10.32	5.68	1.89 75P SPECULAR GLASS (75 DEGREE), PHOTOVOLT	
L388	#	58.10	48.80	-10.56	2.75	1.05 75P SPECULAR GLASS (75 DEGREE), PHOTOVOLT	
L564	X	59.60	49.20	-9.34	1.79	1.21 75P SPECULAR GLASS (75 DEGREE), PHOTOVOLT	
L315	G	63.60	54.90	-2.38	1.98	1.07 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L230	G	63.75	53.36	-3.53	.94	.94 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L128	G	63.90	52.80	-3.89	.48	1.30 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L172	G	63.92	51.58	-4.85	.26	.69 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L291	G	63.93	52.36	-4.22	.20	1.15 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L573	G	64.00	52.70	-3.91	.34	1.31 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L279	G	65.00	54.40	-1.95	.55	1.58 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L483	G	65.04	54.05	-2.20	.31	1.01 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L134	G	65.36	53.01	-2.85	.56	1.08 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L328	X	65.41	60.57	3.25	3.90	1.15 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L349	X	65.42	61.55	4.04	4.48	1.09 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L250	*	65.50	52.85	-2.89	.77	.60 75Q SPECULAR GLASS (75 DEGREE), PHOTOVOLT, 20 C, 65% RH	
L190R	G	65.62	57.41	.84	1.85	.88 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L583	G	65.68	55.91	.33	.91	.89 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L323	G	65.83	54.50	-1.37	.05	1.09 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L396	G	65.85	55.80	-.32	.71	.74 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L206	G	65.95	55.04	-.87	.17	1.05 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L122	G	65.98	55.32	-.62	.32	.83 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L301	G	66.16	54.63	-1.07	-.24	.60 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L321	G	66.30	54.90	-.77	.19	.88 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L182	G	66.36	56.17	.29	.52	1.01 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L456	G	66.46	54.41	-1.07	-.61	.61 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L190C	G	66.50	55.00	-.57	-.29	.85 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L277A	G	66.59	55.66	.01	.03	1.00 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L574	G	66.60	54.50	-.91	.67	1.05 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L149	G	66.60	57.50	1.50	1.12	1.02 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L255	G	66.60	56.40	.61	.46	.73 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L173A	G	66.69	55.60	.02	-.09	.86 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L278	G	66.74	56.20	.54	.23	1.22 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L277B	G	66.78	56.36	.69	.29	1.13 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L256	G	66.80	55.14	-.28	-.45	1.02 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L502G	G	66.93	54.80	-.47	-.76	.98 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L121	G	66.97	54.36	-.80	-1.05	.70 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L288	*	67.02	55.08	-.20	-.66	.86 75I SPECULAR GLASS (75 DEGREE), HUNTER, 20 C, 65% RH	
L213	G	67.08	55.17	-.09	-.66	1.35 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L592	G	67.15	54.12	-.89	-1.34	1.36 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L108	G	67.24	55.91	.60	-.34	1.22 75B SPECULAR GLASS (75 DEGREE), HUNTER	
L223	G	67.25	55.98	.66	-.31	1.02 75B SPECULAR GLASS (75 DEGREE), HUNTER	
L211	G	67.33	56.40	1.05	-.12	.97 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L259	G	67.53	57.35	1.93	.28	1.32 75B SPECULAR GLASS (75 DEGREE), HUNTER	
L502H	G	67.68	56.48	1.32	-.36	.89 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L317	G	67.71	55.36	.44	-1.05	.89 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L262	G	67.80	59.30	3.66	1.23	.76 75K SPECULAR GLASS (75 DEGREE), GAERTNER (K-C TYPE)	
L243	G	67.80	56.10	1.09	-.68	1.13 75B SPECULAR GLASS (75 DEGREE), BAUSCH + LOMB	
L166	*	68.00	60.30	4.58	1.67	.67 75B SPECULAR GLASS (75 DEGREE), BAUSCH + LOMB	
L587	G	68.10	55.20	.54	-1.46	.85 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L153	G	68.15	59.25	3.82	.92	1.19 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L136	G	68.94	57.07	2.55	-1.02	.90 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L251	G	69.30	56.55	2.34	-1.62	.89 75G SPECULAR GLASS (75 DEGREE), GARDNER	
L210	*	70.32	57.63	3.82	-1.79	1.03 75H SPECULAR GLASS (75 DEGREE), HUNTER	
L162	*	70.59	61.77	7.30	.46	.59 75G SPECULAR GLASS (75 DEGREE), GARDNER	

GMEANS: 66.61 55.63
95% ELLIPSE: 6.06 2.21 1.00
WHITE GAMMA = 53 DEGREES

SPECULAR GLOSS, 75 DEGREE

SAMPLE J23 = 66.6 GLOSS UNITS SAMPLE H55 = 55.6 GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDS OF AN INCH
TAPPI STANDARD T411 GS-76

MARCH 1978

LAB CODE	SAMPLE E33 MEAN	PRINTING					SAMPLE J21 MEAN	PRINTING					TEST D. = 10		
		96 GRAMS PER SQUARE METER	DEV	N. DEV	SDR	R. SDR		89 GRAMS PER SQUARE METER	DEV	N. DEV	SDR	R. SDR	VAR	P	LAB
L100	6.208	.110	+1.09	.073	.95		2.953	.039	.47	.052	.91		90V	0	L100
L105	6.345	.027	.27	.049	.63		3.029	.037	.46	.049	.86		90T	0	L105
L118	6.528	.210	2.10	.068	.88		3.142	.150	1.84	.055	.97		90V	0	L118
L122	6.287	-.031	-.30	.101	1.32		3.032	.040	.49	.092	1.62		90V	0	L122
L123F	6.545	.227	2.27	.101	1.31		3.105	.113	1.39	.090	1.58		90P	0	L123F
L125	6.300	-.018	-.17	.110	1.43		2.900	-.092	-1.12	.085	1.49		90T	0	L125
L128	6.277	-.041	-.40	.061	.80		2.988	-.004	-.05	.027	.48		90T	0	L128
L131	6.380	.062	.62	.079	1.02		3.080	.088	1.08	.063	1.11		90T	0	L131
L139	6.466	.148	1.48	.063	.81		3.166	.174	2.13	.048	.85		90T	0	L139
L153	6.324	.006	.06	.066	.86		3.030	.038	.47	.049	.87		90T	0	L153
L158	6.380	.062	.62	.092	1.19		2.960	-.032	-.39	.052	.91		90T	0	L158
L159	6.387	.069	.69	.037	.48		3.071	.079	.97	.031	.55		90T	0	L159
L162	6.274	-.044	-.43	.049	.63		2.954	-.038	-.46	.044	.77		90D	0	L162
L166	6.233	-.085	-.84	.097	1.26		3.033	.041	.51	.072	1.26		90T	0	L166
L173B	6.276	-.042	-.41	.055	.71		3.065	.073	.90	.063	1.10		90F	0	L173B
L174	6.110	-.208	-2.07	.166	2.16		2.830	-.162	-1.98	.106	1.87		90T	0	L174
L182	6.245	-.073	-.72	.046	.60		2.939	-.052	-.64	.028	.49		90L	0	L182
L183	6.251	-.067	-.66	.059	.76		2.982	-.010	-.12	.089	1.57		90T	0	L183
L190C	6.140	-.178	-1.77	.084	1.09		2.960	-.032	-.39	.070	1.23		90T	0	L190C
L203A	6.310	-.008	-.07	.052	.67		2.805	-.187	-2.28	.055	.97		90T	*	L203A
L203C	6.310	-.008	-.07	.070	.91		2.965	-.027	-.33	.058	1.02		90T	0	L203C
L213	6.460	.142	1.42	.070	.91		3.030	.038	.47	.048	.85		90T	0	L213
L221	6.430	.112	1.12	.059	.76		3.100	.108	1.32	.058	1.02		90T	0	L221
L223	6.440	.122	1.22	.075	.97		3.094	.102	1.25	.059	1.04		90V	0	L223
L228	6.340	.022	.22	.094	1.21		2.970	-.022	-.27	.071	1.26		90T	0	L228
L233	6.430	.112	1.12	.134	1.73		3.060	.068	.84	.088	1.54		90Q	0	L233
L238A	6.426	.108	1.08	.053	.68		3.042	.050	.62	.058	1.03		90T	0	L238A
L241	6.245	-.073	-.72	.093	1.20		3.070	.078	.96	.082	1.45		90T	0	L241
L249	6.275	-.043	-.42	.032	.41		2.974	-.018	-.22	.032	.57		90T	0	L249
L260	6.306	-.012	-.11	.032	.42		2.930	-.062	-.75	.046	.81		90T	0	L260
L261	6.340	.022	.22	.107	1.39		3.015	.023	.29	.085	1.50		90T	0	L261
L262	6.250	-.068	-.67	.053	.68		2.900	-.092	-1.12	.067	1.17		90T	0	L262
L291	6.440	.122	1.22	.097	1.25		3.060	.068	.84	.052	.91		90T	0	L291
L297	6.325	.007	.07	.059	.76		2.975	-.017	-.20	.049	.86		90T	0	L297
L309	6.200	-.118	-1.17	.082	1.06		2.850	-.142	-1.73	.071	1.25		90T	0	L309
L318	6.280	-.038	-.37	.109	1.41		2.840	-.152	-1.86	.052	.91		90T	0	L318
L323	6.100	-.218	-2.17	.067	.86		2.780	-.212	-2.59	.063	1.11		90T	*	L323
L324	6.240	-.078	-.77	.107	1.39		3.080	.088	1.08	.063	1.11		90T	0	L324
L326	6.425	.107	1.07	.059	.76		3.075	.083	1.02	.042	.75		90T	0	L326
L328	6.290	-.028	-.27	.120	1.55		2.940	-.052	-.63	.052	.91		90T	0	L328
L331	6.286	-.032	-.31	.056	.73		2.950	-.042	-.51	.040	.70		90T	0	L331
L339	6.165	-.153	-.152	.133	1.73		2.925	-.067	-.82	.086	1.51		90T	0	L339
L341	6.423	.105	1.05	.062	.81		2.972	-.020	-.24	.020	.35		90T	0	L341
L352	6.285	-.033	-.32	.065	.84		3.020	.028	.35	.026	.45		90Q	0	L352
L355	6.316	-.002	-.02	.070	.91		2.999	-.007	.09	.033	.58		90T	0	L356
L358	6.271	-.047	-.46	.069	.90		2.967	-.025	-.30	.045	.79		90T	0	L358
L372	6.319	.001	.01	.043	.56		2.971	-.021	-.25	.064	1.13		90T	0	L372
L376	6.440	.122	1.22	.070	.91		3.050	.058	.71	.053	.93		90T	0	L376
L378	6.215	-.103	-1.02	.100	1.30		2.965	-.027	-.33	.078	1.38		90T	0	L378
L382	6.477	.159	1.59	.082	1.07		3.127	.135	1.65	.051	.89		90T	0	L382
L390	6.261	-.057	-.56	.040	.52		3.019	.027	.33	.054	.95		90T	0	L390
L442	6.429	.111	1.11	.065	.84		3.101	.109	1.34	.045	.79		90T	0	L442
L556	6.269	-.049	-.48	.081	1.05		2.979	-.013	-.16	.040	.70		90T	0	L556
L557	6.210	-.108	-1.07	.074	.96		2.960	-.032	-.39	.052	.91		90T	0	L557
L559	6.330	.012	.12	.065	.84		2.940	-.052	-.63	.046	.81		90T	0	L559
L560	6.426	.108	1.08	.075	.98		2.980	-.012	-.14	.028	.50		90T	0	L560
L561	6.300	-.018	-.17	.125	1.62		2.970	-.022	-.27	.106	1.87		90T	0	L561
L567	6.406	.088	.88	.044	.56		3.067	.075	.92	.049	.86		90V	0	L567
L574	6.139	-.179	-1.78	.076	.99		2.940	-.052	-.63	.048	.85		90V	0	L574
L575	6.231	-.087	-.86	.122	1.58		2.934	-.058	-.71	.037	.65		90T	0	L575
L581	6.410	.092	.92	.066	.85		3.015	.023	.29	.058	1.02		90T	0	L581
L587	6.260	-.058	-.57	.084	1.09		2.860	-.132	-1.61	.052	.91		90T	0	L587

GR. MEAN = 6.318 MILS

SD MEANS = .100 MILS

AVERAGE SDR = .077 MILS

GR. MEAN = 160.46 MICROMETER

GRAND MEAN = 2.992 MILS

SD OF MEANS = .082 MILS

AVERAGE SDR = .057 MILS

GRAND MEAN = 75.99 MICROMETER

TEST DETERMINATIONS = 10

62 LABS IN GRAND MEANS

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE I
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI STANDARD T411 GS-76

MARCH 1978

LAB CODE	SAMPLE H33					SAMPLE J21					TEST D. = 10				
	MEAN	96 GRAMS PER SQUARE METER	DEV	N.DEV	SDR	MEAN	89 GRAMS PER SQUARE METER	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	
L185	6.254	.064	.63	.068	.88	2.942	.050	.61	.030	.54	.90B	♦	L185		
L203B	6.200	.118	-1.17	.170	2.20	2.920	.072	.88	.063	1.11	.90C	♦	L203B		
L242G	6.328	.010	.10	.046	.60	3.006	.015	.18	.059	1.04	.90G	♦	L242G		
L242P	6.312	-.006	-.06	.071	.93	3.053	.062	.76	.033	.59	.90P	♦	L242P		
L243	6.148	-.170	-1.69	.053	.68	3.008	.016	.20	.040	.71	.90S	♦	L243		
L251	6.170	-.147	-1.47	.059	.77	2.935	-.056	-.69	.043	.75	.90W	♦	L251		
L322	6.190	-.128	-1.27	.137	1.78	2.940	-.052	-.63	.126	2.23	.90U	♦	L322		
L330	6.170	-.148	-1.47	.106	1.37	3.000	-.008	.10	.000	.00	.90U	♦	L330		
L344	6.450	.132	1.32	.118	1.53	3.210	.218	2.67	.032	.56	.90U	♦	L344		
L396M	6.100	-.218	-2.17	.082	1.06	2.900	-.092	-1.12	.082	1.44	.90S	♦	L396M		
TOTAL NUMBER OF LABORATORIES REPORTING = 76															

Best Values: H33 6.31 ± 0.16 mils
 J21 2.99 ± 0.14 mils

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDS OF AN INCH
TAPPI STANDARD T411 GS-76

MARCH 1978

LAB CODE	P	MEANS		COORDINATES		R. S.D.R	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		H33	J21	MAJOR	MINOR			
L396M	♦	6.100	2.900	-.229	.057	1.25	90S THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN	
L323	*	6.100	2.780	-.301	.039	.99	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L174	◊	6.110	2.830	-.263	-.005	2.01	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L484	♦	6.118	2.850	-.244	.006	1.20	90E THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN	
L574	◊	6.139	2.940	-.174	.066	.92	90V THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED	
L190C	◊	6.140	2.960	-.161	.081	1.16	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L243	◊	6.148	3.008	-.126	.115	.70	90S THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN	
L564	♦	6.150	2.950	-.159	.067	1.09	90Y THICKNESS (CALIPER), WEAP, HAND DRIVEN	
L576	♦	6.158	3.006	-.119	.107	1.55	90C THICKNESS (CALIPER), CADY, HAND DRIVEN	
L339	◊	6.165	2.925	-.162	.038	1.62	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L330	♦	6.170	3.000	-.113	.095	.69	90U THICKNESS (CALIPER), TMI, HAND DRIVEN	
L251	♦	6.170	2.935	-.152	.043	.76	90W THICKNESS (CALIPER), L + W, MOTOR DRIVEN, 20 C, 65% RH	
L322	◊	6.190	2.940	-.133	.035	2.00	90U THICKNESS (CALIPER), TMI, HAND DRIVEN	
L203B	♦	6.200	2.920	-.137	.013	1.66	90C THICKNESS (CALIPER), CADY, HAND DRIVEN	
L309	◊	6.200	2.850	-.179	-.043	1.15	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L100	◊	6.208	2.953	-.111	.035	.93	90V THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED	
L557	◊	6.210	2.960	-.105	.039	.93	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L373	◊	6.215	2.965	-.098	.040	1.34	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L575	◊	6.231	2.934	-.104	.006	1.12	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L156	◊	6.233	3.033	-.043	.084	1.26	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L324	◊	6.240	3.080	-.009	.117	1.25	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L182	◊	6.245	2.939	-.090	.002	.54	90L THICKNESS (CALIPER), L + W, MOTOR DRIVEN	
L241	◊	6.245	3.070	-.011	.106	1.33	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L262	◊	6.250	2.900	-.109	-.033	.93	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L183	◊	6.251	2.982	-.059	.032	1.17	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L185	♦	6.254	2.942	-.081	-.002	.71	90E THICKNESS (CALIPER), AMTHOR, HAND DRIVEN	
L587	◊	6.260	2.860	-.125	-.071	1.00	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L390	◊	6.261	3.019	-.029	.056	.73	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L556	◊	6.269	2.979	-.046	.019	.87	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L358	◊	6.271	2.967	-.052	.008	.84	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L162	◊	6.274	2.954	-.057	-.004	.70	90D THICKNESS (CALIPER), CADY, MOTOR DRIVEN	
L249	◊	6.275	2.974	-.045	.011	.49	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L173B	◊	6.276	3.065	.011	.084	.91	90F THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN	
L128	◊	6.277	2.988	-.035	.021	.64	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L318	◊	6.280	2.840	-.121	-.099	1.16	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L352	◊	6.285	3.020	-.009	.042	.65	90Q THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN	
L531	◊	6.286	2.950	-.050	-.015	.72	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L122	◊	6.287	3.032	-.000	.051	1.47	90V THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED	
L328	◊	6.290	2.940	-.053	-.025	1.23	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L125	◊	6.300	2.900	-.069	-.063	1.46	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L561	◊	6.300	2.970	-.027	-.007	1.74	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L260	◊	6.306	2.930	-.046	-.042	.62	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L203C	◊	6.310	2.965	-.022	-.017	.96	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L203A	♦	6.310	2.805	-.118	-.145	.82	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L242P	♦	6.312	3.053	.033	.053	.76	90P THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, ISO R534	
L356	◊	6.316	2.999	.003	.007	.74	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L372	◊	6.319	2.971	-.011	-.017	.85	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L153	◊	6.324	3.030	.028	.027	.87	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L297	◊	6.325	2.975	-.004	-.018	.81	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L242G	♦	6.328	3.006	.017	.006	.82	90T THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, E93983	
L559	◊	6.330	2.940	-.021	-.049	.83	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L552	♦	6.337	3.069	.062	.050	1.38	90C THICKNESS (CALIPER), CADY, HAND DRIVEN	
L261	◊	6.340	3.015	.032	.005	1.45	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L228	◊	6.340	2.970	.005	-.031	1.24	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L105	◊	6.345	3.029	.044	.013	.75	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L131	◊	6.380	3.080	.103	.033	1.07	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L158	◊	6.380	2.960	.031	-.063	1.05	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L159	◊	6.387	3.071	.103	.022	.52	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L567	◊	6.406	3.067	.116	.007	.71	90V THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED	
L581	◊	6.410	3.015	.088	-.037	.94	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L341	◊	6.423	2.972	.073	-.079	.58	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L326	◊	6.425	3.075	.136	.002	.76	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L560	◊	6.426	2.980	.080	-.074	.74	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L238A	◊	6.426	3.042	.117	-.025	.86	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	
L442	◊	6.429	3.101	.155	.021	.82	90T THICKNESS (CALIPER), TMI, MOTOR DRIVEN	

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDS OF AN INCH
TAPPI STANDARD T411 GS-76

MARCH 1978

LAB CODE	F	MEANS		COORDINATES		R.S.D%	VAR	AVG PROPERTY--TEST INSTRUMENT---CONDITIONS		
		R33	J21	MAJOR	MINOR					
L232	G	6.430	3.060	.131	-.013	1.64	90Q THICKNESS (CALIPER), EMVECG,	MOTOR DRIVEN		
L221	G	6.430	3.100	.155	.019	.89	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L376	G	6.440	3.050	.133	-.027	.92	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L291	G	6.440	3.060	.139	-.019	1.03	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L223	G	6.440	3.094	.159	.009	1.00	90V THICKNESS (CALIPER), TMI,	MOTOR DRIVEN, DIGITIZED		
L344	H	6.450	3.210	.237	.095	1.04	90U THICKNESS (CALIPER), TMI,	HAND DRIVEN		
L213	G	6.460	3.030	.137	-.055	.88	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L135	G	6.466	3.166	.223	.051	.83	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L382	G	6.477	3.127	.209	.013	.98	90T THICKNESS (CALIPER), TMI,	MOTOR DRIVEN		
L118	G	6.528	3.142	.259	-.006	.92	90V THICKNESS (CALIPER), TMI,	MOTOR DRIVEN, DIGITIZED		
L123F	G	6.545	3.105	.250	-.046	1.45	90F THICKNESS (CALIPER), FEDERAL,	MOTOR DRIVEN		
GMEANS:		6.318	2.992			1.00				
		95% ELLIPSE:		.303	.124		WITH GAMMA = 36 DEGREES			

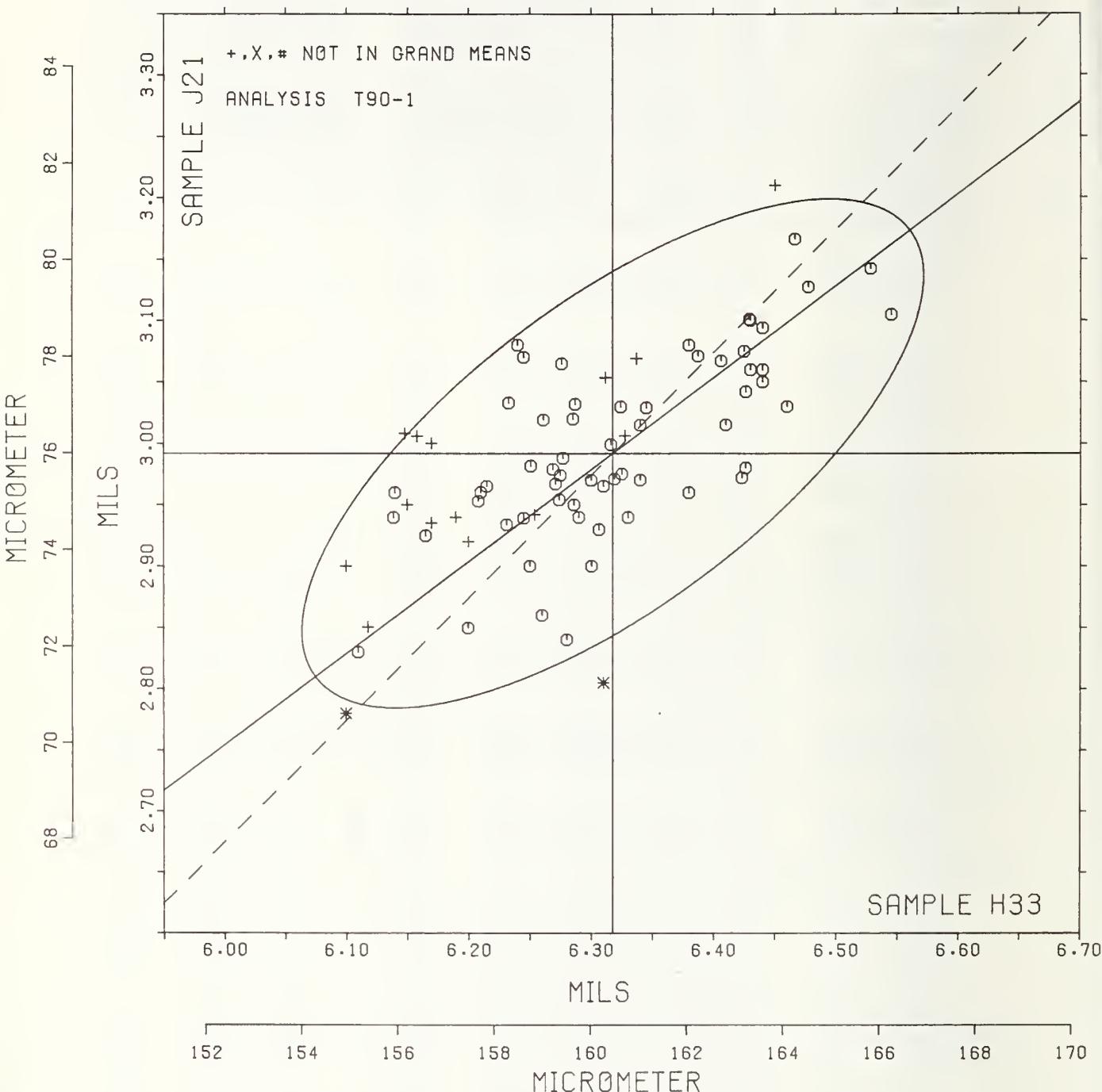
THICKNESS (CALIPER)

SAMPLE H33 = 6.32 MILS

SAMPLE H33 = 160.5 MICRØMETER

SAMPLE J21 = 2.99 MILS

SAMPLE J21 = 76.0 MICRØMETER



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T95-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI STANDARD T410 GS-68

MARCH 1978

LAB CODE	SAMPLE D26	KRAFT ENVELOPE					SAMPLE D27	PRINTING PAPER					TEST D.* 10		
		MEAN	DEV	N. DEV	SDR	R. SDR		MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L100	123.40	.05	.09	.52	.65	.65	76.98	-.03	-.05	.37	.92	95C	#	L100	
L121	123.88	.53	.89	.94	1.19	1.14	78.15	1.14	1.79	.70	1.77	95B	#	L121	
L162	121.50	-1.85	-3.06	.53	.67	76.19	-.82	-1.29	.21	.53	95K	*	L162		
L213	123.68	.33	.55	.87	1.10	77.10	.09	.14	.35	.89	95F	#	L213		
L233	142.30	18.95	31.47	1.49	1.89	90.80	13.79	21.71	.42	1.06	95T	*	L233		
L249	123.10	-.25	-.41	.32	.40	76.62	-.39	-.62	.21	.54	95I	#	L249		
L280	123.48	.13	.22	.94	1.18	76.46	-.55	-.87	.39	.97	95T	#	L280		
L297	124.00	.65	1.09	.00	.00	76.87	-.14	-.23	.29	.72	95C	#	L297		
L339	124.00	.65	1.09	.00	.00	77.08	.07	.11	.09	.23	95T	#	L339		
L344	123.60	.25	.42	.24	.30	77.07	.06	.10	.19	.47	95T	#	L344		
L378	123.03	-.32	-.52	1.28	1.61	77.04	.03	.05	.39	.98	95B	#	L378		
L557	123.60	.25	.42	1.43	1.80	77.20	.19	.30	.42	1.06	95A	#	L557		
L559	23.70	-99.65	-165.43	.31	.39	15.13	-61.88	-97.41	.05	.12	95A	*	L559		
L560	123.33	-.02	-.03	1.01	1.27	76.53	-.48	-.76	.17	.43	95A	#	L560		
L561	123.24	-.11	-.17	1.61	2.03	78.47	1.46	2.30	1.26	3.17	95T	#	L561		
L564	123.03	-.31	-.52	.77	.98	76.15	-.86	-1.35	.27	.69	95B	#	L564		
L597	124.72	1.37	2.28	2.17	2.74	92.90	15.89	25.01	.00	.00	95C	*	L597		
L616	123.31	-.04	-.06	1.18	1.49	77.25	.24	.38	.47	1.17	95T	#	L616		

GR. MEAN = 123.35 G/SQ. METER

SD MEANS = .60 G/SQ. METER

GRAND MEAN = 77.01 G/SQ. METER

SD OF MEANS = .64 G/SQ. METER

TEST DETERMINATIONS = 10

AVERAGE SDR = .79 G/SQ. METER

AVERAGE SDR = .40 G/SQ. METER

15 LABS IN GRAND MEANS

TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best Values: D26 123.4 + 0.6 grams per square meter
D27 77.0 + 1.0 grams per square meter

The following laboratories were omitted from the grand means because of extreme test results: 233, 597.

Data from the following laboratories appear to be off by a multiplicative factor: 559.

TAPPI COLLABORATIVE REFERENCE PROGRAM
 ANALYSIS T95-1 TABLE 2
 GRAMMAGE (MASS PER UNIT AREA)
 TAPPI STANDARD T410 GS-68

MARCH 1978

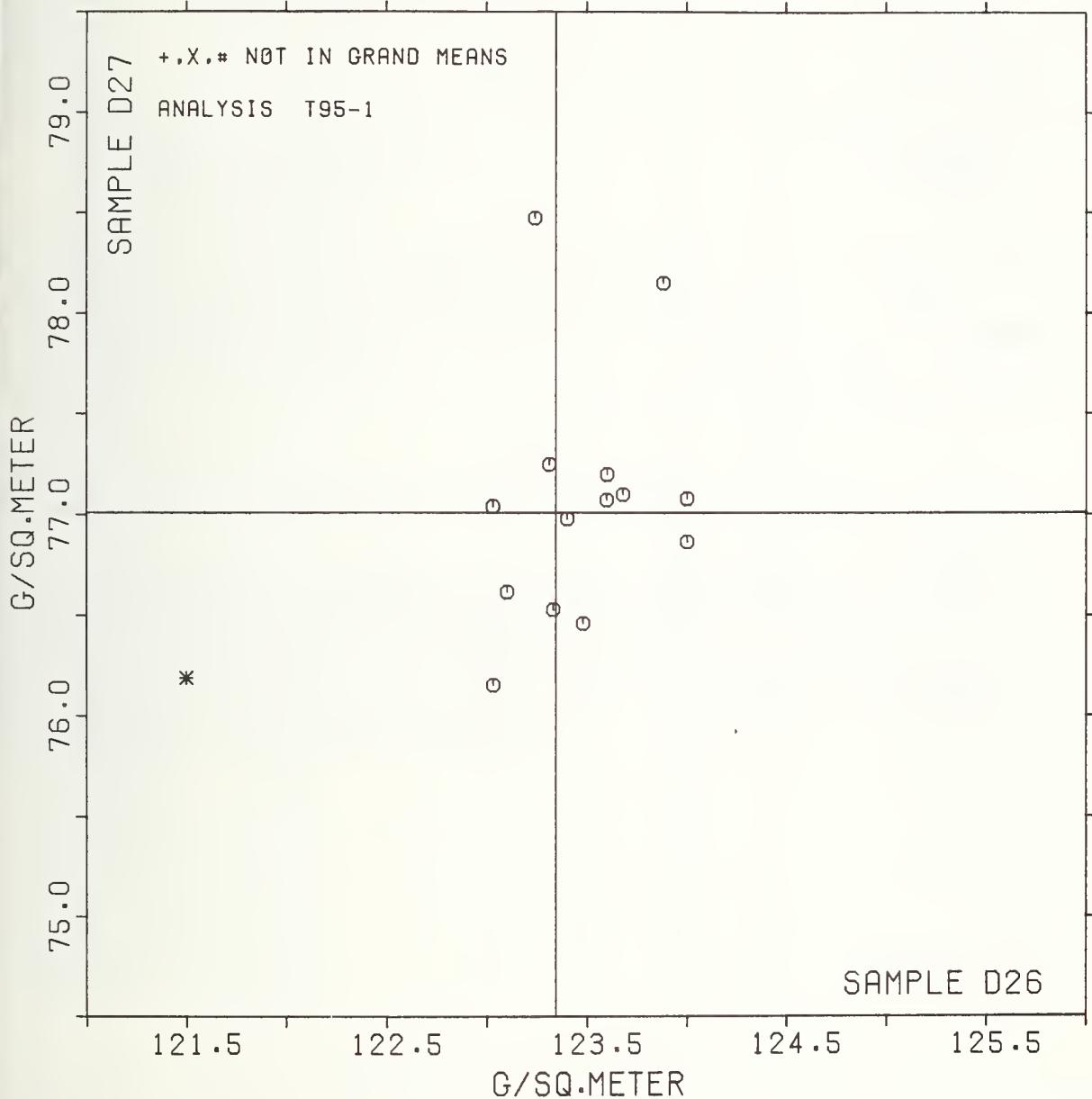
LAB CSDN	F	MEANS		COORDINATES		E.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		D26	D27	MAJOR	MINOR					
L559	#	23.70	15.13	-112.35	33.72	.25	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER		
L162	#	121.50	76.19	-1.84	.84	.60	95K	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED		
L378	G	123.03	77.04	-.19	.26	1.29	95E	BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER		
L564	G	123.03	76.15	-.85	.33	.83	95E	BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER		
L249	G	123.10	76.62	-.46	-.08	.47	95I	BASIS WEIGHT (GRAMMAGE), INGENCO PAPER CUTTER		
L561	G	123.24	78.47	1.02	1.04	2.60	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		
L616	G	123.31	77.25	.16	.18	1.33	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		
L560	G	123.33	76.53	-.37	-.31	.85	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER		
L100	G	123.40	76.98	.01	-.06	.79	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD		
L280	G	123.48	76.45	-.32	-.47	1.08	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		
L344	G	123.60	77.07	.21	-.15	.39	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		
L557	G	123.60	77.20	.31	-.07	1.43	95A	BASIS WEIGHT (GRAMMAGE), CHANDLER + PRICE PAPER CUTTER		
L213	G	123.68	77.10	.29	-.19	.99	95F	BASIS WEIGHT (GRAMMAGE), POUR-SQUARE CUTTER		
L121	G	123.88	78.15	1.21	.35	1.48	95B	BASIS WEIGHT (GRAMMAGE), CONCORA CUTTER		
L297	G	124.00	76.87	.33	-.59	.36	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD		
L339	G	124.00	77.08	.49	-.45	.12	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		
LS97	#	124.72	92.90	12.82	9.49	1.37	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD		
L233	#	142.30	90.80	22.88	-5.08	1.47	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT		

GMEANS: 123.35 77.01
 95% ELLIPSE: 2.12 1.34 WITH GAMMA = 48 DEGREES

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D26 = 123.3 G/SQ.METER

SAMPLE D27 = 77.0 G/SQ.METER



SUMMARY TABLE

TEST METHOD		SAMPLE CGDE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY T40-1	GURLEY UNITS	H49 J45	30.94 12.22	1.64 .56	1.79 .84	10	48	55	10	1.56 .74	4.55 1.55
AIR RESISTANCE, SHEFFIELD T40-2	SHEFF. UNITS	H49 J45	104.5 222.1	5.0 10.4	4.5 12.0	10	36	43	10	3.9 10.5	13.8 28.7
AIR RESISTANCE, GURLEY HG FLotation T41-1	SEC/10 CC	E64 E68	510. 805.	35. 86.	98. 100.	10	15	15	10	86. 87.	97. 237.
SMOOTHNESS, PARKER PRINTSURF T44-1	MICRONS	E36 B91	4.02 4.27	.14 .31	.14 .19	10	7	8	10	.13 .16	.39 .85
SMOOTHNESS, SHEFFIELD T45-1	SHEFF. UNITS	E36 B91	104.9 128.0	5.1 6.3	5.9 9.7	15	91	94	10	5.1 8.5	14.4 18.2
SMOOTHNESS, BEKK T45-2	BEKK SECONDS	E36 B91	45.3 46.2	2.7 5.0	4.6 6.5	15	9	14	10	4.0 5.7	7.8 14.2
SMOOTHNESS, BENDTSEN T47-1	ML/MIN	E36 B91	101.5 121.7	1.2 8.9	10.4 13.7	10	8	10	10	9.1 12.0	3.4 24.7
K & N INK ABSORPTION T56-1	K & N UNITS	H80 H58	66.0 64.4	5.0 5.5	.5 .4	4	8	9	4	.7 .6	13.8 15.2
PH, CGLD T57-1	PH UNITS	J17 J61	4.765 5.622	.181 .047	.052 .064	5	5	7	2	.101 .125	.507 .162
PH, HOT T57-2	PH UNITS	J17 J61	4.38 5.14	.14 .24	.07 .10	5	6	7	2	.14 .19	.41 .67
OPACITY, B&L TYPE, 89% BACKING T60-1	PERCENT	E50 H51	92.29 90.18	.56 .55	.51 .38	10	81	96	5	.64 .48	1.62 1.55
OPACITY, B&L TYPE, PAPER BACKING T60-2	PERCENT	E50 H51	93.31 91.91	.59 .40	.50 .38	10	10	10	5	.62 .47	1.71 1.17
OPACITY, ELREPHO TYPE, PAPER BACKING T60-3	PERCENT	E50 H51	93.99 92.84	.29 .27	.29 .23	10	12	15	5	.35 .29	.84 .79
BLUE REFLECTANCE, DIRECTIONAL T65-1	PERCENT	H31 H53	81.06 68.29	.26 .23	.17 .23	8	20	45	6	.19 .26	.74 .65
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2	PERCENT	H31 H53	81.71 67.92	.81 .92	.06 .20	8	18	21	6	.07 .23	2.25 2.55
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3	PERCENT	H31 H53	81.60 68.89	.59 .67	.07 .19	8	15	15	6	.08 .22	1.64 1.87
SPECULAR GLOSS, 75 DEGREE T75-1	GLOSS UNITS	J23 H55	66.61 55.63	1.57 1.97	.99 1.60	10	47	54	5	1.22 1.98	4.44 5.63
THICKNESS (CALIPER) T90-1	MILS	H33 J21	6.318 2.992	.100 .082	.077 .057	10	62	76	10	.068 .050	.278 .226
GRAMMAGE (MASS PER UNIT AREA) T95-1	G/SQ.METER	D26 D27	123.35 77.01	.60 .64	.79 .40	10	15	18	3	1.27 .64	1.98 1.84

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